ESTIMATING COST-KEEPING *and* PROFIT-MAKING

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ESTIMATING, COST KEEPING AND PROFIT MAKING

in the

Plumbing, Heating and Sheet Metal Trades

Compiled from articles which have appeared in METAL WORKER, PLUMBER AND STEAM FITTER, descriptive of the methods in practical use by some of the leading and most successful merchant mechanics in these trades

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Foreword

As a result of the marked and persistent attention which has been given by the trade associations and by the trade press to promote better business methods among merchant contractors in the plumbing, heating and sheet metal industries, there has arisen a demand for a specialized book of instruction on estimating, cost keeping and profit making in these fields. The business side of these trades has been the subject of many discussions at trade conventions and has been treated from many angles and repeatedly in the trade press. The discussions at conventions have been carried on almost entirely by men who are recognized as leaders in their trade—men who have conducted their business in a systematic way and are successful business men. Other members of the craft have been impressed with the success of these men and have concluded to follow their lead in being systematic.

Many of these leaders have helped along the good work of educating their fellow members in the trade by contributing their ideas to the pages of Metal Worker, Plumber and Steam Fitter. Other men who have succeeded in evolving efficient and practical estimating, cost-accounting and office systems have also helped by furnishing the editors with full information relative thereto so that readers of that publication might have a complete description of these systems. Consequently, there has appeared in Metal Worker, Plumber and Steam Fitter in the recent past a vast amount of valuable information on, and many practical examples of, estimating, cost-keeping and profit-making methods. These articles are not based on theory but have been evolved by practical men in the trade and their efficiency has been demonstrated in actual use. The best of these have been selected and are compiled in this book which the publisher feels will prove a valuable help to men in the plumbing, heating and sheet metal trades, who are endeavoring to work out for their own use practical estimating, cost-keeping and profit-making methods.

These articles include not only specialized systems for the plumber, the sheet metal worker and the heating contractor, but there are many articles which will apply to all the trades, that is, the principles on which the articles are written apply equally well to the plumbing, heating and sheet metal trades.

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THE RIGHT WAY TO FIGURE PROFITS

Explanation of a Simple Problem in Figuring Profits Which Was Answered Incorrectly by Seven Hundred and Fifty Out of One Thousand Merchants

By W. E. Lever*

A manufacturer of store equipment recently caused a question to be printed in a few of the national magazines, business, trade and newspaper publications, designed to find out what percentage of retailers figure their profit correctly. The question had to be printed, of course, as an advertisement, even though it was not advertising in itself. Under the question was an offer to send a "48 page book for retailers" to any retailer who told how he figured the profit problem. Each retailer who answered the problem was also given another little book on the "Right Way to Figure Profits." The publications used had a very wide circulation and of course went to a large number of retailers in every part of the United States and Canada.

LARGE PERCENTAGE OF MERCHANTS FIGURING PROFITS INCORRECTLY

The answers aggregated about 1000, of which 750 were wrong. It is hardly believable that 75 per cent. of all retailers do not know how to figure profits. Some of the readers of this publication will doubt the possibility of such a condition.

Here is the question: A certain article costs $1 wholesale. What will it have to be sold for to allow a profit of 10 per cent., after allowing 22 per cent. for cost of doing business?

---

*Manager of the system service maintained by the Burroughs Adding Machine Co., Detroit, Mich., to aid business men with suggestions based on the company's investigations of methods of successful business houses in all lines.

It is a very simple question—one that every retailer has to answer in his own business every day. But 750 out of 1000 retailers answered it wrong.

The answers ranged all the way from $1.10 to $1.60. The majority gave the selling price as $1.32 or $1.34, allowing a profit of one cent or less, notwithstanding an explanation at the bottom of the question that the answer was not $1.32.

A retailer in Dallas, Texas, answered like this:

> "In answering your question in the *Saturday Evening Post,* will say that if you had not stated that $1.32 is not correct, I would have put that price on the article, for I do not charge any profit on overhead expenses. But if you do, I cannot see any other way of figuring but to charge $1.34 on selling price. Will you please send me your book and please tell me what your selling price is and oblige."

Is there any wonder that this man was not making money? He was on the straight road to bankruptcy and going fast. But he has slowed up now, and will soon be going in the right direction.

CORRECT SOLUTION TO PROBLEM

Perhaps some of the readers of this publication will think that there would be a profit in the article at $1.34, and to make sure that they will understand this Texas merchant's state of progress, it is well to explain why and how he was losing money instead of making 10 per cent. profit as he thought.

If the wholesale price is $1 and the cost of doing business 22 per cent., $1.34 does not allow 10 per cent., but only 1.4 per cent. profit. On a gross annual business of $15,000 he will clear $150 a year, or a little better than $12 a month. He said that if the ad had not stated that $1.32 was not correct, he would have put that price on the article. By selling the article at $1.32 he would lose almost 1 per cent. instead of making 10 per cent. His trouble was that he figured his profit and the amount which he wanted to take out for the cost of doing business, or his percentages, on the cost price instead of on the selling price. Instead of adding 32 per cent. of the wholesale cost to the wholesale cost he should have added 32 per cent. of the selling price to the wholesale cost.

The wholesale cost is not something to be added to, but a portion of the selling price, in this instance, 68 per cent. of the selling price. If the wholesale cost is 68 per cent. of the selling price, then the selling price is evidently $1.47, instead of $1.34, or $1.32. If the cost of doing business is figured on the selling price, that is, 22 per cent. on the gross amount of business done during the year, the cost of selling the article is not 22 cents but 32⅓ cents.

If 10 per cent. profit is desired on the selling price, it is not sufficient to add 10 cents to the cost price. Instead 14.7 cents, nearly 15 cents, must be added. To prove this, take 22 per cent. of $1.47, which is 32.34 cents, and 10 per cent. of $1.47, which is 14.7 cents. Add these to $1 and you have $1.47.

A druggist in Alabama said:

> "If my cost of doing business is 22 per cent. and I wish to make a sale to bear 10 per cent. profit, I should figure it this way:
>
> | | |
> |---|---|
> | Cost and cash | $1.22 |
> | Profit at 10 per cent. | 12.02 |
> | Selling price | $1.34 |
>
> "I would, therefore, sell for $1.34 all articles invoiced at $1.00 for 10 per cent. profit. Am I correct?"

He is incorrect. As stated before, instead of making 10 per cent. profit he would make a fraction over 1 per cent.

A Canton, Ohio, dealer in clothing and furnishing goods figured the problem in exactly the same way with the same result. So did a boot and shoe house at Goshen, Ind.

A lumber, hardware and furniture dealer in a little town in Illinois gave a little different solution, getting very near to the correct method. He deducted 22 from 100, leaving 78. This 78 he construed as being 78 per cent. of the selling price, less his profit. If $1 is 78 per cent. of the selling price, the latter, of course, would be $1.28, which he labeled as the selling price to cover the cost of doing business. Then he deducted 10 from 100, leaving 90, and labeled $1.28 as 90 per cent. of the selling price to cover profit. $1.28, of course, is 90 per cent of $1.42, which he gave as the answer.

He made the mistake of taking his percentage for the cost of doing business out of one sum and his profit out of another. He should have taken both percentages at the same time. He went on to prove his figures, and undoubtedly did prove them, so far as his way of figuring is concerned. But proving that a wrong answer is correct by using a wrong method is like trying to prove that a horse is a horse by pointing out a pig.

This man's letterhead showed that he has a capital stock of $10,000, and that he is treasurer of the company. But he has the wrong job, for he was figuring himself out of five cents on every dollar's worth of goods he bought. He isn't doing it now.

A druggist out in Iowa figured his $1 wholesale cost to give him a selling price of $1.43. He went about it in the right way but figured wrong. First, he subtracted 32 (both percentages) from 100, giving 68; then he multiplied $1 by 100 and divided by 68, giving him $1.43. His method is very much better than his arithmetic. While he goes about it in the right way, he gets the wrong answer by four cents. Multiplying $1 by 100 and dividing by 68 should give $1.47—does if the calculation is performed correctly.

Undoubtedly a good many retailers were afraid of the question, thinking perhaps that if they answered it they would have the whole Burroughs Adding Machine Co. sales force trying to make them buy adding machines. But the offer did not say anything about adding machines except to print a letter from a retail user of Burroughs machines.

Here is part of the reply of one retailer, T. C. Alzamora, a men's hatter and furnisher, Brooklyn, N. Y., illustrating this fear. Mr. Alzamora says:

> ''I do not know that your machine would be of use to me, as I already have a cash register, but I would be interested in any system, not too complicated, that would keep absolute track of a diversified stock like mine.
>
> ''Regarding your question as to percentage, I first calculate what the article will bring retail, then subtract 32 per cent. If the cost is more than this I cannot afford to handle same. The selling price in your example would be $1.47.''

Here is another sensible letter, from H. Bradley, Manager of the McAlister Co., Oregon, Ill.:

> ''We always figure our profit on the selling price, which is the only proper method, as follows:
>
> ''From 100 deduct the percentage of profit desired and divide the remainder into the whole cost of the goods.
>
> ''The quotient will be the selling price.
>
> ''In this case we desire to make a profit of 10 per cent. over the cost of doing business of 22 per cent.
>
> ''We take 32 from 100, leaving 68. Divide this into 100 and we get $1.47, the selling price, which will show you the desired per cent of profit.''

Here is a letter from A. D. Hogan, Glen Village, N. Y., which shows appreciation:

> ''Your question in the *Saturday Evening Post* entitled 'What Is the Selling Price?' attracted my attention.
>
> ''I picked up my pencil to work it out, but it did not come. Then I took a sheet of paper and went at it with the result given below. It was a revelation to me.
>
> ''The figures applied to every-day sellers in my own stock proved that many articles were only returning a bank interest profit. It was a surprise to me.''

Then he goes on to figure it out for us in the following very sensible way:

Let the selling price equal	100 per cent.
Deduct for cost of doing business	22 per cent.
Deduct for profit	10 per cent.
Cost is 68 per cent. of selling price	68 per cent.
Then 68 per cent. is	$1.00
1 per cent. is	0.0147
100 per cent. is 100 times .0147 or	$1.47

The cost price of an article is not a thing to be added to. It is a per cent. of the selling price.

COMMENTS ON THE FOREGOING

From Southerner, Alabama—"The Right Way to Figure Profits," by W. E. Lever, differs in method from all instruction heretofore received by me, and he appears to be figuring a profit on the profit.

Let gross cost equal 100 per cent.

Add 10 per cent. profit equals 110 per cent.

22 per cent. of which equals 24.2 per cent.

Deduct from gross cost equals 75.8 per cent. equals net cost.

Net cost is $1.00, divided by 75.8 per cent., equals $1.32.

Add 10 per cent. profit equals $1.45, selling price.

If I am not correct, I would be pleased to have a full explanation.

From Plumber, Pittsburgh, Pa.—When I read the article on "The Right Way to Figure Profits" I felt that the matter was perfectly clear to me, but when I tried to figure out the trouble with "Southerner's" method of figuring profits as given in the issue of May 31, I concluded I did not understand the question of figuring profit as well as I might. However, I put in a little time on the original article and the inquiry of "Southerner," and now think I have the matter straight.

I think the two governing statements in the original article in the issue of May 17 are these: "The cost price of an article is not a thing to be added to. It is a per cent. of the selling price." In other words, the cost of doing business and the profits is each reckoned as a percentage of the selling price, not a percentage of the cost price. For example, if a merchant's annual business amounts to $10,000, his cost of doing business being $2500 and his profit being $2000. His cost of doing business, expressed as a per cent. of his selling price, is then 25 per cent. and his profit is 20 per cent. If "Southerner" will figure on this basis when his cost of doing business is 22 per cent. and he wishes to make a profit of 10 per cent., he can solve the problem as follows:

Selling price equals 100 per cent. of selling price.

Cost of doing business equals 22 per cent. of selling price.

Profit equals 10 per cent. of selling price.

Cost of doing business plus profit equals 32 per cent. of selling price.

The remainder, or 100 per cent. of selling price minus 32 per cent. of selling price, or 68 per cent. of selling price, is the cost price. The cost price is $1.00. Therefore 68 per cent. of the selling price equals $1.00. Therefore 100 per cent. of the selling price will be $1.00 × 100 ÷ 68 = $1.47.

From R. S., New York City—I have been much interested in the article on "The Right Way to Figure Profits" and also in the discussion by readers which followed. But despite all the discussion I am still puzzled when it comes to applying the principle to my own business. For instance, we sell an article for $8 the wholesale cost of which plus the cost of doing business is $6. I maintain that we are making 33⅓ per cent. profit; that is, $2 on a $6 article. One of our bookkeepers, who also read the article, claims that we are making only 25 per cent. profit, basing his calculation on $8 instead of $6.

What I want to know is: (1) Am I right? (2) If I am not, why not? (3) And if I am wrong, what should be the selling price?

NOTE: It is an established custom in this country to reckon the profit as a percentage of the selling price. If the sales in any store are $15,000 in a year and the profit therefrom is $3000, the profit will be reckoned as 20 per cent.; that is, the profit is considered as 20 per cent. of the sales. If the correspondent will inquire of his grocer or other supplyman he will unquestionably find, if his grocer has a regular business system, that he reckons his profits as a percentage of the selling price. As explained in the earlier discussion on this subject, the cost price of an article is not a thing to be added to. It is a per cent. of the selling price.

DO RETAILERS FIGURE THEIR PROFITS CORRECTLY?

Rules to be Observed in Computing Percentage of Profit on Selling Price

It may be stated in the beginning that there may be more than one correct way of figuring profits, and it is not contended that the old method of using the cost of the goods as the basis from which to figure the percentage of profit and the cost of doing business is mathematically incorrect. All arithmetics teach that the cost of an article should be the basis from which to start figuring rates of percentages. However, the same results may be obtained in another way that to many minds is much more satisfactory, more easily figured and much safer for the merchant.

For instance, we will assume that a merchant's volume of business is $100,000 per year. His expenses of doing business are $20,000 per year and his profits are $10,000 per year. This leaves the cost of the goods sold at $70,000, or, in other words, his expense of doing business is 20 per cent. of his sales; his profits are 10 per cent. of his sales and his cost of goods is 70 per cent. of sales.

This problem may be figured just as correctly by using the $70,000 as a basis and dividing it into the $20,000 and $10,000 to get the respective rates of expense of doing business and profits. But this is what frequently happens, using the same figures as above for volume of business, expense of doing business and profit. He figures as we have above that it costs him 20 per cent. to do business and he wishes to make 20 per cent. plus 10 per cent., which is 30 per cent. of the business, then he marks his goods in a way that he believes will bring him this profit and adds 20 per cent., plus 10 per cent., which is 30 per cent. of the first cost of his goods.

If a table cost him wholesale $10, he will make it at $13, figuring that 20 per cent. or $2 will cover the expense of doing business and 10 per cent. or $1 will give him his desired profit. As previously shown, these profits were determined on the selling price of goods, and it therefore costs him 20 per cent. of $13 or $2.60 to sell the table, leaving him only 40 cents as profit.

If all of his goods are marked in this same manner, instead of having $10,000 profit at the end of the year he will have just $4,000, and he wonders what became of the difference between the $4000 that he has when he closes his business for the year and the $10,000 which he provided for when he marked his goods.

What he should have done was to have added together his 20 per cent. expense of doing business and 10 per cent. profit, making a total of 30 per cent. This subtracted from 100 per cent. would leave 70 per cent, which represents the cost of goods. Divide this into the $10, the cost of the table, and we find that the selling price should have been $14.29; 20 per cent. of this would be $2.86, which would be the expense of doing business, and $1.43 would have been left for profit.

This same result could have been obtained of course by using the $10, first cost of the goods, as the basis, but in that case his rate of expense for doing business would have been 28.6 per cent., and on a basis of 10 per cent. of the selling price for profit his rate of profit would have been 14.3 per cent.

It is certainly more satisfactory for a man to mark his goods so that he will know how much of each dollar taken in over the counter belongs to him as profit, and how much must be set aside to cover the expense of doing business, and how much represents the first cost of the goods.

To use the above illustration on the basis of $100,000 volume of business, out of each dollar taken in over the counter, 10 cents belong to him as profit, 20 cents must go toward paying the expense of doing business and 70 cents must cover the cost of the goods sold.

By figuring in this way he is enabled at any time to determine from a recapitulation of his sales just what his profits to date should be. It also enables him to determine whether he is keeping the expense of the business within the 20 per cent. which he estimated should cover all items properly chargeable to the expense of handling the business. Seventy per cent. of his sales should also represent the cost of the goods sold.

It can be seen from this how simple a matter it is to secure all these figures from a daily sales record, where much time and effort would be required to secure the same data if one had to go back to the cost of the goods.

There are a number of advantages in figuring from the selling price rather than from the first cost of the goods, not the least of which is the fact that the seller always has before him the selling price of the goods sold and scarcely ever the cost price.

To reiterate, it is not to be understood that this is the *only correct method* of figuring profits. In fact, it is simply reversing the percentages in order to make it easier for the merchant to know from day to day or from month to month, whether his business is realizing the profits that he anticipated when marking his goods.

QUESTIONS AND ANSWERS ON THE FOREGOING

From Plumbing Contractor, Boston, Mass.—I should like the opinion of readers of *Metal Worker, Plumber and Steam Fitter* who may have had experience in cases similar to mine on a question which has arisen between my firm and a man for whom we have just finished a large contract. I agreed to complete the work on the basis of cost plus 10 per cent. profit and to submit all invoices and labor charges to him at the final adjustment. On making up the cost of the work I found it came to $1,250, this being the net cost to me of labor, freight and cartage, materials and incidental expenses. My ordinary overhead expenses were not charged in the costs at all, as the arrangement was a special one relieving me of practically all financial risk during the progress of the work. My final statement calls for a gross charge of $1388.80, and the profit of 10 per cent. I asked amounts to $138.80, leaving the net cost as $1250. My customer maintains that I should only require a payment of $125, and while the difference is only a small one I believe I am right in asking that I be paid on the gross amount. I should be glad to hear what others have to say regarding it.

From W. C. L., Norway, Me.—In regard to the question of "Plumbing Contractor" in the issue of September 27—where does the gross amount of $1388.80 come from? The net cost as per his figures is $1250, and $1250 plus 10 per cent. = $1375. If there is anything more than this it fails to show in his statement. As I have been taught to figure discounts and percentages of profits they should be figured on the cost, not on the cost plus per cent. of profit. That in my opinion is figuring on something that does not exist. I am seeking for information, not criticizing.

From T. L. S., Cincinnati, O.—Although I do not profess a very deep acquaintance with accounting methods, I would like to point out to "W. C. L.," whose letter on the basis of fixing profits appeared in the issue of October 4, that in taking exception to "Plumbing Contractor's" methods of figuring a percentage of profit on his contract he is following along lines which have been shown by recent articles in *Metal Worker, Plumber and Steam Fitter* to be erroneous. If "W. C. L." desires to make 10 per cent. on the total amount of business done by him in a year he will not do it by adding 10 per cent. to his contract price. If he will figure back from the gross total of $1375 that he gives in discussing the question in the issue of September 27 referred to, he will find that

10 per cent. on this would have been $137.50, while all that he would have received would have been $125 by his method of figuring. Where did that $12.50 go? "Plumbing Contractor" was right. If he wished to make 10 per cent. (and when a dividend is declared on the earnings of a company it is estimated by taking the balance shown as earned and figuring it against the amount of all the business done—not against what the business cost to do) he was right in estimating it on the gross amount and this was $1388.80.

It all depends on whether the business man sets out to earn a certain amount of money or a certain percentage of profit. If he says I wish to make $50 on this job and it will cost me $500 to do it, well and good; he charges $550. If he says I wish to make 10 per cent. on my year's business and this job costs him $500 he does not add 10 per cent. to the cost and make it $550, as 10 per cent. of $550 would be $55 and his cost would show then as only $495. In reality if he set his price at $550 his profits would show only as a little over 9 per cent. This is only a matter of terms—if $2000 a year is satisfactory to a man it makes no difference whether it amounts to 6 per cent. or 10 per cent. on his total sales. If, on the other hand, he sets out to make 10 per cent. on his sales it is important that he be started right. The articles that have appeared in recent numbers of *Metal Worker, Plumber and Steam Fitter* have given very valuable information on estimating and are worth preserving for the solution of just such questions.

From E. B. H., Greenville, Me.—I have been greatly interested in reading in recent issues the views of different men on their ways of fixing profits. I was particularly interested in the article by "Plumbing Contractor" in the issue of September 27. Now it seems to me to be a very simple problem in percentage and I will attempt to explain it in this way. "Plumbing Contractor'' takes the job, furnishing all material and labor at cost, and does not in this case add anything to this cost for overhead charges, and for his trouble and profit is to receive 10 per cent. In other words, his bill will be made up of 90 per cent. cost and 10 per cent. profit. Now this being the case, it is plain to me that the $1250 which the material and labor costs must represent 90 per cent. of the contract price. This being true, 1 per cent. of the contract price is 1/90 of $1250, or $13.888, and 100 per cent. or the contract price is 100 times $13.888 or $1388.88, the gross charge the contractor should make. He is certainly right in making such a charge and should receive that amount under the terms of the contract. When a man says he made ten per cent. on his business for a year he means that he made 10 per cent. of the sum of all the bills he rendered his customers during the year.

THE QUESTION OF DELUSIVE PROFITS

How Actual Profits can Readily be Ascertained when the Expense of Doing Business and the Selling Increase over Cost Price is Established.

The necessity for resorting to harsh methods in making collections is alike distasteful to the creditor and debtor. In many instances there would be no need for activity for collection if the figuring of profits were understood. The cost of delivered goods does not, of course, include the cost of operating one's business, and even where some percentage for the cost of doing business is recognized by fixing the selling price at a certain percentage above the cost of the goods, there is a failure to comprehend that the percentage of profit is not the percentage added to the cost less the percentage representing the cost of doing business.

At a meeting of the Eastern Supply Association the table reproduced herewith was distributed among the members and needs little explanation. The top line represents the percentage of the cost of doing business, which a business man may figure or determine on the basis of his sales of a previous year or period. The vertical column at the extreme left represents the percentage added to the cost of the delivered goods to obtain the selling price. It is commonly held that after, say, 25 per cent., is added and then the percentage found to cover the cost of doing business is deducted, the balance represents the actual percentage of profit. There has been so much delusion that the table will be of particular value.

If a line is dropped under the 15 per cent. column in the table, covering the cost of doing business to a point where it intersects a horizontal line corresponding to an allowance of 33⅓ per cent., as the addition to be made to the cost price, the figure at the point of intersection

TABLE FOR FIGURING NET PROFITS

If your cost of doing business figured on sales is represented by one of these figures

	%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%
And you mark your goods at one of these percentages above delivered cost,	25	10	9	8	7	6	5	4	3	2	1	00	1 Loss	2 Loss	3 Loss	4 Loss	5 Loss
	$33\frac{1}{3}$	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	00
	40	$18\frac{4}{7}$	$17\frac{4}{7}$	$16\frac{4}{7}$	$15\frac{4}{7}$	$14\frac{4}{7}$	$13\frac{4}{7}$	$12\frac{4}{7}$	$11\frac{4}{7}$	$10\frac{4}{7}$	$9\frac{4}{7}$	$8\frac{4}{7}$	$7\frac{4}{7}$	$6\frac{4}{7}$	$5\frac{4}{7}$	$4\frac{4}{7}$	$3\frac{4}{7}$
	50	$23\frac{1}{3}$	$22\frac{1}{3}$	$21\frac{1}{3}$	$20\frac{1}{3}$	$19\frac{1}{3}$	$18\frac{1}{3}$	$17\frac{1}{3}$	$16\frac{1}{3}$	$15\frac{1}{3}$	$14\frac{1}{3}$	$13\frac{1}{3}$	$12\frac{1}{3}$	$11\frac{1}{3}$	$10\frac{1}{3}$	$9\frac{1}{3}$	$8\frac{1}{3}$
	60	$27\frac{1}{2}$	$26\frac{1}{2}$	$25\frac{1}{2}$	$24\frac{1}{2}$	$23\frac{1}{2}$	$22\frac{1}{2}$	$21\frac{1}{2}$	$20\frac{1}{2}$	$19\frac{1}{2}$	$18\frac{1}{2}$	$17\frac{1}{2}$	$16\frac{1}{2}$	$15\frac{1}{2}$	$14\frac{1}{2}$	$13\frac{1}{2}$	$12\frac{1}{2}$
	75	$32\frac{6}{7}$	$31\frac{6}{7}$	$30\frac{6}{7}$	$29\frac{6}{7}$	$28\frac{6}{7}$	$27\frac{6}{7}$	$26\frac{6}{7}$	$25\frac{6}{7}$	$24\frac{6}{7}$	$23\frac{6}{7}$	$22\frac{6}{7}$	$21\frac{6}{7}$	$20\frac{6}{7}$	$19\frac{6}{7}$	$18\frac{6}{7}$	$17\frac{6}{7}$
	100	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25

Your percentage of net profit is represented by the figure at the junction of the two columns.

EXPLANATION—If your cost of doing business is 15% of your gross sales and you mark a line at 25% above cost, your net profit is 5% on sales—as shown in the diagram. If your cost of doing business is 18% and you mark a line at 60% above cost, your net profit is 19½% on sales.

shows a profit of 10 per cent., rather than as some might quickly assume, 33⅓ — 15 = 18⅓ per cent. That it is correct, however, may be shown by working out the figures in detail. Suppose an article cost $1. If its selling price is 33⅓ per cent. greater than the cost price, the selling price will be $1.33⅓. If it is found that the cost of doing business is 15 per cent., the proportionate cost for the goods which cost $1 is equal to 0.15 × $1.33⅓ = 20 cents, and the net return is $1.33 — .20 = $1.13. This shows that the profit is 13 cents, and 13 cents is 10 per cent. (0.13 ÷ 1.33 = 0.10) of the selling cost, that is, of $1.33⅓. Similarly if the cost of doing business is 20 per cent. and 25 per cent. has been added to the cost of the delivered goods the profit is as follows: A $1 article sells for $1.25. The cost of business is 20 per cent. of the selling price ($1.25), or 25 cents; therefore there is no profit, instead of 0.25 — 0.20 = 0.05 or 5 per cent. as sometimes assumed. The point is, of course, that the selling cost is based on the cost price; the cost of doing business is based on the selling price; and the profit must necessarily be based on the selling price. The table will be of value as quickly indicating how much of an increase should be made to the cost of the articles in order that a desired profit may be obtained after account is taken of the cost of doing business.

THE STUMBLING BLOCK TO PROFIT MAKING

The Cost of Doing Business and the Cause of Discrepancies in Estimates—Information of Importance to Plumbers and Heating Contractors Circulated by National Associations*

That there is something wrong with the "Plumbing Business," not even the most visionary disciple of that business will attempt to deny, and what that wrong may be, undoubtedly most of us, who are engaged in that particular line and have balanced our books for our last fiscal year, know only too well. It can be summed up in these few words: It has ceased to be profitable.

There may be other features about it which each of us would cite as a wrong, if called upon to submit a list, but the common ground, where we can all agree, is the one above mentioned.

Now why should this state of affairs exist and what has brought it about?

No doubt, each one of us believes that he can answer this question in a manner entirely satisfactory to either his own wisdom or conceit, but let us look at it collectively, as a body of men, engaged in a legitimate branch of industry, whose interests are pretty much identical and mutual.

To be sure, we each have our own local competition and each feels that it is the very worst competition that ever existed. What makes it so and who is to blame?

That it is easier to ask intelligent questions in relation to this subject than to give correspondingly intelligent answers, we will admit, but it is none the less true that some of the answers are so well known to us that we shall immediately recognize their correctness.

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*From a booklet issued by the joint committee of the National Association of Master Steam and Hot Water Fitters and the National Association of Master Plumbers

Our first answer is this:

We are not conducting our business in accordance with those methods, accepted by the great majority of business men in other lines, as being absolutely essential to success. We must observe the rules of the game, but before we can observe them we must learn them. Unfortunately, too few of us really learn them—we spend our lives attempting to dodge them, although most of us know that they exist, and we also know that the truly successful men are observing them.

GOOD MAXIMS FOR THE MASTER PLUMBER

We shall not attempt to formulate a full set of these rules for your guidance, but there are a few which we desire to bring directly to your attention at this time, as follows:

1.—Be sure that you do not attempt to estimate on work with which you are not entirely familiar.

2.—Confine your efforts to that class of work for which you have the necessary capital, and ability to handle it properly.

3.—Be satisfied to creep before you attempt to run.

4.—Establish a reputation and a credit.

5.—Never sell anything below cost.

6.—In estimating, remember that your bid should be made up of three principal divisions: ''Materials and Labor''—''Overhead Charges''—and ''Profit.''

7.—Do not pay too great attention to what your competitor may be doing.

8.—Never be afraid to demand for a piece of work the price to which you feel sure you are entitled.

9.—Acquire the habit of refusing to take work at the other fellow's figure.

10.—Avoid doing work for general contractors.

11.—Be a loyal member of both your local and national associations.

The foregoing do not begin to comprise all the rules of the game of business, but if you will learn these few short ones, and observe them, you will find, when making up your balance for the next year, that your item of "Cash on hand and in bank" will have a pleasing surprise in store for you.

THE COST OF DOING BUSINESS

Each one of us may have an idea that, when it comes to making up an estimate covering the cost of a certain piece of work he is the one particular person better fitted than anyone else to do it and do it correctly; and yet, a study of the facts in any specific instance would seem to indicate that this idea is not altogether well founded.

With a set of well drawn plans and clearly defined specifications before us, there would seem to be no good reason why our estimates should vary so widely. In the hands of intelligent estimators, the quantities should be approximately the same, and while a slight advantage may be enjoyed by a few of us in the matter of cost of our materials, it is not sufficient to explain the very wide variation. The ordinary estimate, while made up of a great many items, may for the purposes of this discussion be summarized under four principal headings as follows:

1. Cost of materials. 2. Cost of labor. 3. Cost of doing business ("overhead charges"). 4. Profit.

As to the cost of materials, as we have said before, there is no reason why every bidder, who exercises due care in taking off his quantities, and who really knows how to take off those quantities, should not have approximately the same amount to cover this item.

Cost of labor is in every sense an estimated item—no one can state definitely just how many days will be required to do a certain piece of work. We all have ideas as to the time required and these ideas are in most cases backed by experience, but, after all, it is largely a matter of judgment—with many of us it seems to be a matter of positive guesswork.

HOW TO ESTIMATE LABOR COSTS

There are no rules laid down which govern this all important item, but if its cost is made up honestly, by one who is fitted to do it, if due consideration is given to the required time for each particular part of the work, if the time is based not upon what the quickest and cleverest journeyman is able to accomplish, but upon what the journeyman of average ability can do; if due allowance is made for lost time and for the smoothing out of the many perplexities which always arise on any job, then we shall be more nearly together in our estimate of the number of days required.

With the cost of labor as high as at present we cannot afford to estimate an insufficient amount to cover it, for if our actual time exceeds very many days our estimated time, our entire profit in many instances is eaten up.

NOTE: In many offices, on all important work, no less than three (sometimes as many as five) competent men estimate on the item of labor, each absolutely independently of the other. If the time estimated by these men runs fairly close, then the average is usually accepted; but if there is a wide difference, then the three or more get together and go over the work, item for item, and discuss it pro and con and finally decide what amount is to be used.

The foregoing is cited to impress upon you the importance of this item. You may say you have no one but yourself to depend upon for this work. If that be so, call up your foreman, and if you have no foreman talk it over with one of your journeymen, in whose judgment you can trust.

Finally: If you must guess—guess big and then double it.

Now we come to the cost of doing business, or more briefly called overhead charges. This item is, perhaps, less generally understood than any other in the entire estimate.

Many of us are what are known as "practical" men. We may not have enjoyed much of a business training, but have acquired what knowledge we have in the hard school of experience—with the tools and on the job. Others of us lack this practical knowledge, but have secured our training through the office end of the business—the school of system and of cost and profit.

Each of us has much to learn from the other, but what we all should know is what overhead charges really means.

In the conduct of a business, however small, there are certain items of expense for which we have to provide, whether our sales are large or small—they are unavoidable and cannot possibly be sidestepped.

1.—The rent has to be paid.

2.—The bill for heat and light has to be paid.

3.—The salaries of bookkeeper, stenographer and salesmen have to be paid.

4.—Liability insurance on workmen has to be paid.

5.—Fire insurance on shop, tools and merchandise has to be paid.

6.—The telephone bill has to be paid.

7.—The bill for cartage has to be paid.

8.—Interest on invested capital must be considered.

9.—Depreciation of tools and replacement of same must be considered.

10.—Percentage of bad accounts must be considered.

These may not be all the items, and probably are not, that go to make up the major item of overhead charges but they are sufficient in number to cause each one of us to realize the supreme importance and magnitude of this division of our cost and how absolutely foolish it is for us to assume that we can keep on in business without making any charge for it.

It is just as surely a part of our cost as any article of merchandise which we estimate to furnish. In amount it will vary according to the extent of the business and the

HOW TO MAKE A PROFIT

REMEMBER, WHEN MAKING UP YOUR ESTIMATE OF COST that there are three principal divisions of same.

FIRST: THE COST OF ALL MATERIALS AND LABOR.

SECOND: THE COST OF DOING BUSINESS (OVERHEAD CHARGES), which is rarely less than fifteen per cent. (15%) of the cost of materials and labor.

THIRD: THE PROFIT which should never be less than ten per cent. (10%).

Any one who willfully neglects the careful consideration of each of these three divisions of an estimate and fails to add something to cover them, need not wonder why he is making only a "bare living."

These divisions are made up as follows:

FIRST: Materials of all kinds as taken from the plans and called for in the specifications, and the labor for properly installing same.

SECOND: THIS DIVISION is one which, unfortunately, THE MAJORITY OF THE CRAFT LOSE SIGHT OF ALTOGETHER. It is WHAT IT COSTS YOU TO DO BUSINESS (OVERHEAD CHARGES), whether your business amounts to $5,000 or $50.000 per year, and IT IS EXPENSE WHICH YOU MUST MEET and which YOU WILL NEVER GET BACK UNLESS YOU CHARGE IT UP.

IT IS MADE UP of such items as rent, insurance (both fire and labor), salaries of all employees (salesmen, bookkeepers, stock clerks and stenographers), interest, trucking, etc., and is just AS PROPERLY A PART OF YOUR COST as boilers and radiators or bath tubs and soil pipe. DON'T FORGET that YOU CANNOT AFFORD to "throw it in."

THIRD: The profit. EVERYONE OF US is entitled to an amount over and above the amount of the cost, TO PROVIDE A LIVING FOR OURSELVES AND THOSE WHO ARE DEPENDENT UPON US, and to compensate us for having had THE ABILITY AND BRAINS to get together an organization capable of doing the class of work which we are called upon to do.

EVERYONE expects us to make it. WHY disappoint them? It should NEVER be less than ten per cent. (10%) over and above all other items of cost, and IT WILL BE FOUND SAFER to never figure less than fifteen per cent. (15%).

WITH THESE FACTS BEFORE YOU, if YOU FAIL TO OBSERVE THEM, you do so WILLFULLY, and if you make a failure of your attempt at business, YOU HAVE ONLY YOURSELF TO BLAME.

REMEMBER, "THERE ARE NONE SO BLIND AS THOSE WHO WILL NOT SEE."

prudence or extravagance with which the business is conducted, but it is always there and cannot be lost sight of. Each one can determine for himself just how much of an item this is—experience has taught those of us who keep an accurate account of such matters that it is rarely less than fifteen per cent. (15 per cent.) of our gross volume of business.

In other words, if our gross sales amount to $100,000 per year, our overhead charges probably amount to approximately $15,000, and this $15,000 has to be provided for before you can hope for any profit. It is part of the cost.

With reference to item 4, the profit, men differ as to what they consider a proper amount, but nearly everyone agrees that it should never be less than ten per cent. (10 per cent.). It is our opinion that never less than fifteen per cent. (15 per cent.) should be charged, and this, on small jobs, is not sufficient.

It is well to remember that there are "lean" years as well as "fat" years and the percentage of profit must be of such extent as to average well over a long period, if we hope to keep going. So then, our cost should be made up as follows:

1. Merchandise. 2. Labor. 3. Overhead charges. 4. Profit—not forgetting overhead charges.

COMPUTING COST OF DOING BUSINESS

Explanation of Figuring Out Cost of Doing Business and Percentage to Add to Cost to Include a Profit in Quotations on Contracts

By L. E. Legrow*

A simple method of figuring out the cost of doing business was given by L. E. Legrow, president of the Ontario Society of Domestic Sanitary and Heating Engineers at a recent meeting of that body in Toronto. The report as given in the *Plumber and Steam Fitter of Canada* follows:

The man who periodically blows off in the exhaust pipe about living nye to die, states that money never yet has bought as good a time as a small boy can have with a crooked stick, a fish line and a can of worms. (I like these sentiments.) But I suppose that the boy would soon lose his happiness if, after fishing for some time, he caught no fish. (Natural, isn't it?)

Here we are—grown-up boys—spending and being spent, laying waste our store, troubling ourselves about others when properly the trouble lays in us. Getting and spending, worrying and being worried, optimistic and pessimistic, thinking that progressive business methods require us to secure every job that comes on the board, at a profit if we can, below cost if we must, in order to compete and beat out our fellow craftsmen. Why is it that in our business we do not seem to discover the minimum at which we can profitably work? Do we take so much money for a little while and have it properly charged to our private account? Maybe we take smaller amounts from our business continually without keeping account of it so that at the end of our financial year we know how much money we owe and are owed, but for the life of us we do not know how much money we have spent.

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*President of the Ontario Society of Domestic, Sanitary and Heating Engineers

Gather around, fellow sanitarians, and let us have a little chat about facts. Understand, the easiest thing to do is to roll down a hill, but in order to roll down you must climb up. Now are you down or up? If you are down, the only way up is to start going and, when you get up to the top, stay there. Now for the start—We are going to spend $1.00 this way:—

Rent	2c
Telephone and insurance	½c
Printing, postage, stationery, car tickets, light	½c
Repairs and replacing tools, cartage, defective material and breakages	1c
Losses on bad accounts and discounts given in order to make a settlement	1c
Bookkeeper's salary	4c
Proprietor's salary	8c
Materials purchased	55c
Wages purchased	28c
	$1.00

Now watch us very closely, the spending of it may deceive us. We spent $1 fairly accurately and very economically. We may have charged something for the $1 while it was around working for us, or we may have loaned it on mortgage and received 5 cents for it, but we did not do so bad; we did not hide it and feel afraid that it would be lost.

But do not forget that $1 which we are talking about. One year has passed and we are elated over the number of dollars we turned over, and now having taken stock we find that we have done a business last year of $15,000. Not so bad for the average sanitarian. Let us try and find how it works out.

Our merchandise purchases in order to do this $15,000 worth of business amounted to $11,000, wages $4000—$15,000.

What it has cost us on uncontrollable expenditure in order to do this amount of business:—

Rent	$300.00
Telephone	50.00
Insurance	15.00
Printing, postage and stationery	40.00
Car tickets	25.00
Light	12.00
Cartage	75.00
Repairs of tools, and replacing worn tools	50.00
Losses on bad accounts and credits given to settle accounts	100.00
Cost of material and time to replace bad material	50.00
Salary, bookkeeper	600.00
Salary, proprietor	1,200.00
Miscellaneous	33.00
	$ 2,550.00

Now you will notice that this is equal to 17 cents on the dollar of $15,000, so that for every dollar we pay in merchandise purchases and wage purchases it has cost us 17 cents in order to buy this merchandise and wages and sell them again. Now then, suppose that we have a contract where the material and wages will cost $150. In order to pay our overhead expenses it is necessary to add 17 per cent. on to the $150, which equals $25.50. Now then, suppose we would like a small profit on this amount of $175.50 in order to create a capital in our business, and to have some remuneration for our time and worry outside of the small salary that we have.

Let us add on a nominal sum of 10 per cent. on to $175.50, which makes $17.50, or a total of $193. So that you can readily see that in order to make a profit out of your $150 job it is necessary to add on the 17 per cent. on the amount of $150, plus 10 per cent., which is very small profit for doing work.

Now it does not matter what method we adopt in order to find out our overhead expenses. It is not necessary that we should employ an auditor and have an elaborate system of checking. Any one of us can write on a piece of paper what our overhead expenses are, and if we recognize the fact that we intend to stay in business and have a fair profit or a small profit on the amount of business that we do we must put on a profit over and above our overhead expenses, and the simpler the method we use the more success we likely will have.

COMPUTING COST OF DOING A PLUMBING BUSINESS*

By George F. Reeke

On November 23 a letter was sent to each member of the association, requesting information as to how many had adopted systematic methods of doing business, and instituted cost systems. Out of 290 letters your president received 17 answers to the questions enclosed in this communication. To the questions which I will read the answers are as follows:

1. Do you keep a cost system? Answers—Yes, 12; No, 5.

2. Do you keep an accurate account of all the material that is used on contract work? Answers—Yes, 13; No, 1; on most all work, or when in doubt, 3.

3. Do you set aside a certain sum each year for your salary? Answers—Yes, 10; No, 7.

4. If you do your own work, do you charge the time spent in estimating, collecting, and such other losses of time which are not productive, to expense? Answers—Yes, 4; No, 4; unanswered, 4. Three answer that they do not do their own work; one does not charge for his time, and one figures this expense in his salary.

5. Approximately, how much business do you do per year? This ranges from $3500 to $100,000, the largest percentage doing from $18,000 to $25,000 worth of business.

6. What do you pay journeymen plumbers, helpers and laborers? This varies in the different localities.

7. What do you charge per hour for plumbers, helpers and laborers? It is interesting to note that in localities

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*Paper presented at Meeting of Wisconsin State Master Plumbers' Association, at Green Bay.

where $4.50 per day is paid to journeymen plumbers it is customary to charge 75 cents per hour. My experience, which I will verify later by facts and figures, shows that every time a plumber is sent out to do a job of work at this price we are just breaking even. Judging from the answers received, most of us are making more profits on what we charge for helpers and laborers, and I would suggest that some of us would do better to devote more time to what is bringing us the largest revenue and employ our laborers to good advantage.

8. What do you add of profit on contract work? This is where most of us are lame. Answers: One 10 per cent.; two 15 per cent.; one 12 to 25 per cent.; one 12 to 30 per cent.; one 35 to 50 per cent.; one 25 to 33 1/3 per cent.; one 30 per cent.; one 10 to 25 per cent.; two 25 per cent.; one 20 per cent.; one 25 to 100 per cent.; one 20 to 35 per cent., exclusive of overhead expenses; two, depends on kind and size of job; one 30 per cent.

I will now give you a report of a plumbing business in which the various items have been treated separately, this being for eight months' business, as the year does not close in this particular business until March 30.

HOW TO FIGURE PERCENTAGE COST OF DOING BUSINESS

An expert accountant was called into consultation, and in his opinion the proper way to treat the figuring of overhead expense is to figure the net cost of merchandise purchased, the net cost of productive labor paid out, and add these items; then add the total net expenses and divide by the former, which gives us the total overhead expense to be added to the net cost of material and labor figured on contract work.

There are some that would figure the total amount of money received for merchandise sold in contract and day work, and divide this into expense, which naturally would give us a lower percentage cost of doing business, but if this lower percentage of overhead expense were added to the net cost of material and labor figured on contract work, you would find yourself short at the end of the year on the amount of overhead expense so added.

EXPENSES, EIGHT MONTHS

Salary	$1,000
Rent	225
Light	10
Heat	19
Telephone	32
Cartage	10
Stamps	32
Bookkeeper	320
Driver	160
Non-productive labor	50
Horse and wagon	114
Binding, printing and stationery	56
Sundry Expenses: Trips, donations, advertising, etc.	176
Association dues	44
Repairs and Replacements	32
Insurance	31
Bad accounts	63
Interest on Investment	133
Depreciation on equipment	95
Taxes	25
	$2,627

COSTS, EIGHT MONTHS

Merchandise	$5,474
Merchandise	5,567
Total merchandise	$11,041
Discount	72
	$10,969
Less investment	2,278
	$8,691
Productive labor	3,811
	$12,502
Freight to be added	225
	$12,727

The total cost, $12,727 ÷ $2,627, expense 20.6, which is the net percentage cost of doing business.

PROPORTIONING OVERHEAD CHARGE TO SERVICE

Charging the Costs of Conducting a Business to the Parties Requiring the Most Service—How Charging on a Percentage Basis May Work Injustice to Both Parties—Methods Outlined by a Plumber Contemplating Entering Business

By W. B. W.

In the callow days of my apprenticeship to the plumbing trade I was prone to contemplate the happy lot of my employer and to calculate the fabulous profits he was rolling up as the results of my efforts, backed up by those of my equally hard-working associates in the shop. This is how I arrived at the profits. It is unfortunately the same method as is used by too many plumbers in active business:

"Time of Bill Smith in laying 10 ft. of lead water pipe, and in wiping two joints, putting back the fixture and boards when the pipe was fitted. Four hours.

Bill gets	$1.50
Me—the helper, I get	.62
The pipe costs the boss	1.80
The solder on the two joints costs	.37
The job costs the boss	$4.29

"Now, I happen to know what the boss charges for Bill and me, and what he has the nerve to ask for solder and lead pipe, and this is what his bill will look like:

Labor of plumber, 4 hours	$2.00
Do. helper, do	1.00
30 lb. of lead pipe, at 10c	3.00
1½ lb. of solder, at 40c	.60
The boss charges	$6.60

"Two dollars and thirty cents clear profit, Bill, what d'ye think of that! Twice a day. Four dollars and sixty cents.

Six men at that; more than $27 dollars a day, Bill! Gee! some people have the nerve.''

I said these were my callow days. I hope that I have become better acquainted with the expenses incidental to conducting a business by this time, for it is my purpose to enter into it on my own account very soon and my present purpose is to outline what I expect my running expenses will amount to and how I propose to make my customers pay them.

I have been greatly interested in the cost-keeping articles appearing from time to time in *Metal Worker, Plumber and Steam Fitter*. Like many another journeyman I have been preparing for the time when I would be able ''to hang out my shingle'' and, therefore, I have read with avidity everything which has appeared along these lines. No article interested me more than that by B. F. John some time during the summer of 1912. Although it had application principally to the sheet metal trades, I could see that it might serve equally well the plumbing branch, and with this in mind I have worked out an estimate of what it will cost me to do business and how I mean to charge overhead expense so that it will be borne in just proportion by my customers.

In the first place, it is my intention to purchase the business to which I had reference in my opening remarks. I know now that the $27 a day which I generously allowed my old employer as a profit on our labors was many times too great. I also know that he, like many another honest and competent mechanic, was a poor business man and his business has suffered accordingly. Therefore, I am now about to assume the ownership on a payment of $2500, which will leave me a balance of about $1000 on which to do business until I can accumulate some profits. If I can make this $27 a day then very soon I shall have ample capital but—I shall be considered fortunate if I can make that amount in a week.

ESTIMATED AMOUNT TO BE PAID FOR WAGES AND CHARGEABLE TO CUSTOMERS

Proportion of own time—one half	$600.00
Time of 3 journeymen. Scale 45 cents per hour. 50 weeks at 44 hours per week	2,970.00
Time of 2 helpers. Scale 20 cents per hour. 52 weeks at 48 hours per week	998.40
	$4,568.40
Less helpers' time not chargeable	400.00
	$4,168.40

ESTIMATED OVERHEAD EXPENSES

Rent of store and shop	$360.00
Rent of stable and yard	96.00
Feed, harness and wagon repairs	312.00
Telephone	30.00
Light, heat and incidentals	100.00
Postage, stationery, advertising, office, sundries, insurance	200.00
Depreciation and replacement of tools	50.00
Proportion of own time not chargeable	600.00
Proportion of helpers' time not chargeable	400.00
Bookkeeper's salary	520.00
Interest on investment of $3,500.00	175.00
	$2,843.00

I expect to do a business of about $15,000 a year. I estimate this from what has been done and from the promises made me, and no one can do more than make a guess. In all my reading of articles I have not yet seen any suggestion as to how the beginner could arrive at the amount of the overhead charges he was advised to make, and, therefore, I have set out to find out as nearly as possible what mine are going to be. The accompanying table of wages and expenses will show what I expect to pay out in securing and executing this $15,000 worth of business.

I have not included freight or express charges as overhead expense. I intend to add these to invoices as part of the cost of the materials. If it costs $2843 to carry on my shop then I shall have to charge that up and, therefore, on the basis of a $15,000 volume of business, I would be compelled to add 18.9 per cent. to my bills or estimates before I made any allowance for profits. For convenience I will call it 20 per cent.

Now let us see who is to pay this. It may be that this is not a fair method of levying the charge although it is absolutely certain that my customers will have to pay it. For instance, if Jones asks me to give him an estimate for replacing his old bath tub and basin with solid porcelain fixtures and Smith asks me for an estimate on the plumbing of his new double tenement house, both of which will come to about $200, shall I add $40 to each? If I do, Jones will say I am asking an exorbitant price although I may not be asking any more profit on my total year's business than my competitors and at the same time am charging each and everyone of my customers prices fixed on the same scale.

This is how I figure it out. The labor on Jones' job will only require the time of a man and a helper two days. That on Smith's job will take the time of a man and helper ten days. There will be seven or eight trips of the delivery wagon to Smith's job, two to Jones'. I will have to visit Smith's job three or four times at least and Jones' not more than twice. Why should Jones pay as much for supervision, teaming and other items that come under the head of overhead expense as Smith who is getting more for his money?

Now taking my table of wages chargeable to customers it will be found that my estimated overhead expenses come to about 68 per cent. of this amount. Is it not right that I should accordingly charge my customers on this basis, and make them pay in accordance with the amount of work done and service rendered? If I add to the labor bill 68 per cent. of the labor cost I have taken care of the just proportion of overhead expense that the customer should pay. If I add this to all estimated labor costs when making bids I ought to be able to keep all of my bids on a uniform scale because if at any time I estimated a job on which it is desired to secure prices for an alternative line of fixtures the difference in the price should the higher line of fixtures be selected might be enough to throw me out of the running, while if I adopt the same method of charging expense to every job, I can take care of my expenses and still show a lower price for the higher class of work. This is how it would work out on a typical job.

Cost of material	$1250.00
Cost of labor	250.00
Overhead expense, 20 per cent	300.00
	$1800.00

Using the alternative method:

Cost of material	$1250.00
Labor cost	250.00
Sixty-eight per cent. added to labor cost	170.00
	$1670.00

To which is to be added the profit desired, say $200, which would make the estimates $2000 and $1870 respectively.

Supposing that the owner decided to select a higher grade of fixtures and that these would add an additional $200 to the bill, then the estimates made up on the two plans would be as follows:

Cost of material	$1450.00
Cost of labor	250.00
20 per cent. overhead expense	340.00
	$2040.00
Profit	200.00
	$2240.00

If the expense is charged according to cost of labor:

Cost of material	$1450.00
Cost of labor	250.00
Overhead expense 68 per cent. additional labor cost	170.00
	$1870.00
Profit	200.00
	$2070.00

I can see that this method of adding overhead expense to estimates will work out easily and accurately, but I am not at all clear as to how it will work in charging for jobbing work. I cannot make an item and openly charge up overhead expense so-and-so. Neither can I charge a customer for 168 hours of labor if my men have only worked 100. Therefore I think that on this class of work I must count on making as nearly as possible a charge of 45 per cent. over the cost of the material. This ought to leave me, after deducting my 20 per cent. of overhead expense about 12 per cent. net profit, which is about what I aim to make on all work.

This is easily seen if the cost of an article is taken at \$1.00. Add 45 per cent. = \$1.45. Deduct 20 per cent. for overhead expense = 29 cents leaves \$1.16. The sixteen cents represents net profit and is equal to a little over 11 per cent. on the gross volume.

I cannot see how any other method of charging can be arranged as I must stick to the same labor scale as my competitors. That is the only item in a bill upon which the average customer is competent to pass and if I charge 60 cents to one, 62 cents to another and say 75 cents per hour to a third there will be trouble. As, however, some 60 per cent. of my total business will be contracted for, I think I can safely proceed to charge my expense on the basis of labor. Upon this point I would value the advice of experienced business men. How is the scheme likely to succeed?

COMMENT ON OVERHEAD EXPENSE PROBLEM

By S. H. Morgan

In a recent issue of *Metal Worker, Plumber and Steam Fitter* is an article by W. B. W. on the subject of overhead expense.

I find that this correspondent has allowed some errors to creep into his tables, which should not be allowed to pass without attention being called to them.

It is a pleasure to see so many of our craft taking a deep interest in this subject, as the writer has spent a considerable amount of time in an endeavor to get it before the men engaged in the plumbing business and anything that will assist in convincing them of the importance of figuring their overhead expense as a part of their legitimate cost is a move in the right direction and must help all.

It is gratifying to note that W. B. W. figures it will cost him 20 per cent. of his sales to operate his business, as nearly every writer upon this subject has conveyed the idea that an ordinary plumbing business can be carried on with a smaller percentage and no doubt some have been misled on account of such statements, while as a matter of fact the average percentage will be above rather than below 20 per cent.

I cannot agree with W. B. W. in his contention that it would be wise to add the total overhead expense to labor. He admits it is confusing when he attempts to do so on his jobbing work and suggests another method as applying to this work. He will find other conditions where it will not answer, and in endeavoring to work out methods for each new and different problem he will find he has complicated the whole matter. In the end he will resort to guessing and eventually find that he does not know where he is at. Get a single system and apply it to all work and if it does not prove the ideal thing under all circumstances it will at least be safe. If expense is added to labor only it will be found that while the percentage figured at the first of the year was correct for the previous year, there is a further chance of error in that, if the year's business runs to a class of medium-priced fixtures, the labor will be more in proportion to the sales than if a high-grade line of fixtures were used. As this cannot be avoided the safest and best way is to apply the overhead expense as a percentage of labor and materials combined. It will then be a simple problem to determine from time to time whether the percentage as fixed for the year is correct or not, and should conditions change the percentage may be changed as required. The only reason I can find for trying to find some other way of handling the overhead expense, other than adding it as a percentage of labor and materials is that it at first seems somewhat complicated, but if it is given the study and attention it deserves it will be found that it is very simple and by far the best method to pursue.

In W. B. W.'s illustration he takes an example, using the following figures:

Cost of materials	$1250.00
Cost of labor	250.00
Overhead expense, 20 per cent.	300.00
Total	$1800.00

He shows $300.00 as the overhead expense to be added, using 20 per cent. of the *cost of labor and material* to obtain same. Earlier in his article he figures out that his expense will equal 20 per cent. of his sales. This is a very serious mistake, one very often made and a very expensive one to follow.

Suppose W. B. W. wishes to make 10 per cent net on this same job, it should have been figured out in this manner:

20 per cent. of sales = overhead expense.

10 per cent. of sales = net profit.

Then 70 per cent. of sales must equal cost of labor and materials.

70 per cent of sales = $1500.00.

1 per cent. of sales = $1500.00 ÷ 70, or $21.43.

100 per cent. of sales = 100 × 21.43 = $2143.00.

To make the formula more simple just add two ciphers to the $1500 and divide by 70 and the selling price is obtained.

In the same manner the amount to add separately for the expense and profit items may be found. This is a very common error and one which must not be overlooked, as the difference between the overhead expense and the proper cost of same figured as above is $428.86 instead of $300.00. Some difference? Yes, enough to put one out of business in a short time if neglected. Note also that by adding 68 per cent. to labor as he advocates, that it would amount to less than one-half the amount necessary to be added to cover the expenses as estimated by himself.

Be careful to figure both expenses and profits as a percentage of the sales and not figure one on the cost of labor and materials which is a smaller amount, and the other on the sales, or greater amount.

COMMENTS ON THE OVERHEAD EXPENSE PROBLEM

Proportioning Overhead Expense on Productive Labor or on Gross Cost

By Cost Student

In a recent issue of *Metal Worker, Plumber and Steam Fitter* is an article by "W. B. W." on the subject of overhead expense. In the next issue is a comment on this article by S. H. Morgan, who points out to the reader some of the errors which crept into "W. B. W.'s" method of overhead calculation.

Here is the proposition in a nutshell: "W. B. W." advocates the use of productive labor cost for a basis on which to figure expense, while Mr. Morgan firmly believes that the only dependable basis can be that of the combined cost of material and labor. Now just to illustrate that remarkable variation caused by the use of the two methods let us suppose that "W. B. W." and Mr. Morgan are operating businesses in the same city under the same condition of overhead charges. "W. B. W." figures out that his expense cost runs 50 per cent. of productive labor, while Mr. Morgan figures that his expense cost is 20 per cent. on volume of business or gross sales. Just for illustration we will make use of the following figures:

Gross sales or annual volume of business................	$50,000
Annual overhead charges............................	10,000

Mr. Morgan figures out his ratio by dividing his gross sales into his overhead charges and finds that his expense cost figures 20 per cent. on gross sales, note this, on gross sales, not on material and labor costs. By keeping accurate cost of his productive labor "W. B. W." finds that during the year he purchased $20,000 worth of labor, this being the net amount paid out for all labor after extracting from the total labor cost the non-productive labor cost, which of course he adds to and computes in his overhead charges. He figures out his ratio by dividing his labor cost into the annual expenses and finds his ratio to read 50 per cent. on productive labor cost.

Through analysis of his labor account he finds that during the year he purchased 10,000 productive hours, thus his overhead charges read 20 cents per hour. For illustration we will say that their working year consisted of 300 working days; therefore their overhead cost would read $6.67 per day.

EXAMPLES TO ILLUSTRATE PRINCIPLES

We will suppose that they are called upon to submit their estimates on three different proposed contracts that we may illustrate the remarkable variation which will occur through the use of a different basis upon which to figure expense cost; also that we may have the opportunity of selecting which might seem the most equitable basis to use.

EXAMPLE NO. 1. JONES CONTRACT

Material cost	$100
Labor cost	100
Total cost of material and labor	$200

MR. MORGAN ESTIMATE "JONES CONTRACT"

Material cost	$100
Labor cost	100
Material and labor cost	$200
20 per cent. overhead charges on gross sales would necessitate 25 per cent. on material and labor costs	50
Mr. Morgan's estimated cost	$250

"W. B. W." ESTIMATE "JONES CONTRACT"

Material cost	$100
Labor cost	100
50 per cent. overhead charges on productive labor cost	50
"W. B. W.'s" estimated cost	$250

Comments on the Overhead Expense Problem

It will be noted that on the "Jones Contract" their estimated costs run identical.

EXAMPLE NO. 2. BROWN CONTRACT

Material cost	$500
Labor cost	100
Total cost of material and labor	$600

MR. MORGAN ESTIMATE "BROWN CONTRACT"

Material cost	$500
Labor cost	100
Material and labor cost	$600
20 per cent. on gross sales overhead charges	150
Mr. Morgan's estimated cost	$750

"W. B. W." ESTIMATE "BROWN CONTRACT"

Material cost	$500
Labor cost	100
50 per cent. overhead charges on productive labor cost	50
"W. B. W.'s" estimated cost	$650

EXAMPLE NO. 3. SMITH CONTRACT

Material cost	$100
Labor cost	500
Total cost of material and labor	$600

MR. MORGAN ESTIMATE "SMITH CONTRACT"

Material cost	$100
Labor cost	500
Material and labor cost	$600
20 per cent. on gross sales overhead charges	150
Mr. Morgan's estimated cost	$750

"W. B. W." ESTIMATE "SMITH CONTRACT"

Material cost	$100
Labor cost	500
50 per cent. overhead charges on productive labor cost	250
"W. B. W.'s" estimated cost	$850

Now the question, which method is more in keeping with accuracy, which basis upon which these overhead charges are figured is more closely associated with the elements which are influential in the control of the overhead and maintenance expense?

In the first example where the prime elements of cost are equal, that is where the material and labor costs are identical, their estimated costs run the same. In example No. 3, where the labor cost greatly exceeds the material cost, Mr. Morgan's cost reads $100 less than "W. B. W.'s" computed cost and $100 greater in example No. 2, where the material cost is the greater.

From the many arguments in favor of the productive labor for a basis, it would seem that "W. B. W.'s" method and estimated costs are more in keeping with the natural inclinations of the contractor's expense cost, especially when we know that expense cost is an occurrence of time, commensurate with period, and as the labor cost is also measured by time, is also equal with period. Why are not the expense costs very closely associated with and measured out largely in keeping with the labor cost. Does it look logical to suppose that "S. H. M." computed overhead charges in example No. 2 should be identical with that computed in example No. 3 when the period of installation in example No. 3 is probably five times greater than that found on the other contract?

It does not seem that we are dealing out justice to burden a contract necessitating a 20-day period of installation with the same amount of overhead charges as one which will require a 100-day period of operation. It does not seem correct for Mr. Morgan to compute his overhead charges in example No. 2 the same as in example No. 3 just because a more expensive grade of fixtures are possibly used in this case while the period of installation is decidedly different.

The manufacturer of to-day practically considers his operating expenses as a matter of period, the greater portion of them using productive labor cost as a basis on which to figure this cost. Why are not the controlling elements of cost found in the contracting business very similar to those with which the manufacturer has to deal? The contractor purchases his stock or special plant very similar to the manufacturer's purchase of his raw material. Then just as soon as labor is added to it this stock advances in value and continues until the period of installation is complete and the contract finished.

What do you think about it, brother craftsmen? Does it not seem to you that "W. B. W.'s" method is worthy of serious consideration?

Let us have a friendly discussion of this subject through these columns and try and be of service to one another, thus building for ourselves and the craft a more satisfactory business with better profit.

PROPORTIONING OVERHEAD EXPENSE TO SERVICE

Discussion on Methods of Distributing Overhead Expense to Give Justice to Contractor and Customer—Comments on Previous Article

By B. F. Henry

The proposition advanced by "W. B. W." in the *Metal Worker, Plumber and Steam Fitter* offers some interesting problems. In examining the propositions we must ask two questions; are they just to the plumber and to the customer, and then are they practicable?

Those who have studied and talked up this matter of overhead expense among the craft meet many and diversified opinions as to the proper proportioning, both in the methods of arriving at the amount of overhead expense and in placing the burden.

PROPORTIONING BURDEN

The proposition of placing the burden according to the amount of service rendered by the proprietor is one that has many adherents. It is to the mind of the author incorrect mathematically, unless the proportion is estimated also on the service of the proprietor of the business. For example, "W. B. W." estimates an overhead expense of $2843 per annum. In order that each job may bear its overhead expense proportioned on the services of the proprietor we would have to say, in order to be mathematically correct: The proprietor gives 44 hours for 50 weeks, making 2200 hours. The overhead expense is, approximately, $1.29 per hour on each hour of his time. This would place the burden of overhead expense mathematically on the amount of service rendered by the proprietor.

The same mathematical principle would hold good in placing the overhead expense on the cost of labor involved. "W. B. W." estimates that proportioned to labor cost the overhead expense is 68 per cent. Either way he can cover his overhead expense account. And by doing this he will have an *advantage* over his competitor *on some jobs.* Also he will be at a *disadvantage* over his competitor *on other jobs*, accordingly as the three factors of material, labor and superintendence preponderate in one job or the other. That these factors vary very considerably in different jobs is a fact so well known to all of us as to need no elucidation at this time.

One can also put the overhead expense entirely on the material and do it in a mathematically correct manner, obtaining similar advantage over a competitor on some operations and being at a similar disadvantage on others.

QUESTION ON CORRECT PRINCIPLE

The question that here presents itself is simply this: Which is the correct principle? And this again brings up the question: What is it that occasions overhead expense? Is it the proprietor's activity? No. For he may be sick and unable to attend to business. Or he may own the business, but not be active in it, hiring someone else to attend to it. In either case the overhead expense goes merrily on. Clearly the proprietor does not occasion the overhead expense.

Is it the labor that occasions this expense or the fact that labor is employed? Partly, but only in a small part. The boss may work alone without any help or he may have very much help. He will find that the percentage of overhead expense has not varied very materially due to either of these circumstances. There are other lines of mercantile businesses that employ practically very little labor. We can all call to mind some lines that employ practically no labor. Still they all have overhead expense. Clearly it is not labor alone that creates overhead expense.

Then why should the customer whose particular job carries a preponderance of supervision, called proprietor's time, or whose particular job carries a preponderance of labor bear the entire or even the greater share of the overhead expense burden.

THE ELEMENT OF RISK

There is another element entirely lost sight of by those who favor placing the overhead expense on labor only or on any other factors, excluding material; that is, the element of risk. Surely there is a much greater risk involved in handling a $150 solid porcelain bath tub than in handling a cheap steel-clad tub, both on account of the nature of the article as well as on account of the greater cost involved. Also it will cost more to carry the $600 set of bath-room fixtures on your books for from 60 to 240 days than it will to carry the modest $50 set of fixtures for the same length of time. Furthermore, the chances are greatly that the more modest account will be settled sooner than the larger one; also the well-known fact that the more expensive job eats up more time and more of your overhead expense as a rule.

Overhead expense is occasioned by the simple fact that you are in business. Every part and element going to make up that business in its entirety helps to make overhead expense. And the business in its entirety should rightly bear this expense or burden.

Of course, it is possible to figure out with approximate mathematical exactness how much each separate element contributes to the burden; how much each particular job and its component parts ought to bear—*but*—to do this presupposes an accounting department many times more extensive and expensive than any plumbing business of the present day can afford. It would run up the overhead expense to a prohibitive extent; therefore, is impractical.

FAIR WAY OF PLACING OVERHEAD

In the face of the foregoing it is self-evident that the fair, just and practical way is to find what proportion your overhead expense bears to the total amount of business done, and then to let each job in its entirety bear its proportion of the burden. Your shop or business is there for the accommodation of the public. The public who make use of this accommodation should and must in justice pay for its maintenance. If the public does not need this accommodation it will not patronize it and you go out of business. It is certainly absolutely fair and right that those patronizing your business pay for its maintenance. Too often it is maintained at the expense of the proprietor's wife and children and at the expense of creditors, simply because the proprietor does not know what it costs him to maintain this public accommodation.

Just a word or two on the list comprising "W. B. W.'s" overhead. He charges one-half his time only to overhead expense. He will find that doing $15,000 worth of business and employing three men, he will not be able to work personally one-half of the limited number of hours he allows himself pay for. He will find that taking proper care of the business will take about four-fifths of his time, and he will be obliged to put in a little overtime at that.

I well remember the time when I thought I could do this stunt, only to find that while I was earning $1 at one end of the line some unforseen event was costing me $2 at the other end.

ESSENTIAL ITEMS OMITTED

Furthermore he has no charge for collections and bad accounts; he pays no taxes; he spends no money for car fares; he has no waste materials; neither does he expect to make any allowances on bills for settlement or for dissatisfaction; he does not expect to replace any defective goods or does he expect to do any advertising, either directly or indirectly, or does he expect to pay any association dues. In fact he expects to run his business more economically than it is possible to run a plumbing business successfully at the present day.

Statistics gathered from a number of shops in operation over a wide term of years and covering several states show a low overhead cost of 23 per cent. on some $50,000 worth of business; all of which was jobbing; both contract and day's work jobbing, and a high overhead of 46 per cent. on some $30,000 worth of business; the greater proportion or two-thirds of which was new work, while the mean average overhead was from 25½ to 36 per cent. on shops running from $2400 to $100,000 worth of business of all kinds. I have heard men say that their overhead expense was 10, 15 or 18 per cent., but have not yet seen any authentic statements bearing this out. But it would, in my opinion, be extremely hazardous for any beginner to expect to do business with a lower overhead expense than 25 per cent., as it is rather more likely to be over than under that figure.

The error made by "W. B. W." in adding his overhead expense to gross cost was taken up by Mr. Morgan in a recent issue. I will not, therefore, go into it further than to quote an actual happening.

EXAMPLE OF COMMON ERROR

A friend of mine did considerable work for a real estate agent who exacted a 10 per cent. commission. Our friend soon found that he could not afford to pay this out of his own pocket, as a good part of the work was done in competition at a close margin of profit. Therefore, he added 10 per cent. to all bills going through the agent's hands, thinking that he was getting hunk.

One month the bills totaled just $100 even. Jack fixed them with the usual 10 per cent. loading, so the statement went in at $110. The agent who usually took anywhere from two to four months between settlements, happened to be in funds and at once sent back a check for $99, which represented $100, less 10 per cent. commission. Jack could not understand how his $100 had shrunk to $99 and brought his troubles to the association meeting. The matter there being elucidated on the blackboard showed that $100 plus 10 per cent. = $110, and $110 minus 10 per cent. = $99 only. Since then Jack adds 12 per cent. to all bills going to this party and the blackboard illustration now shows $100 plus 12 per cent. = $112; $112 minus 10 per cent. = $100.80, showing conclusively that it takes almost 12 per cent. added to an invoice to make up an allowance of 10 per cent. off.

Tables showing these ratios of replacement are in print and "W. B. W." by applying to the editor of the *Metal Worker, Plumber and Steam Fitter* will be put next. Also another mighty good stunt would be for "W. B. W." to put in an application to the nearest master plumbers' association, where the experience of all the others would be his for the asking.

COMPARATIVE OVERHEAD EXPENSE STATEMENTS

Some Figures Compiled from Actual Records Showing Necessity of Knowing Accurately the Cost of Doing Business—and Including Necessary Percentages in Charges

By B. F. Henry

Two facts must ever be kept in mind in estimating the cost of doing business. One is that there is no universal percentage applicable to every case. Each man must find his own costs and govern himself accordingly. At the same time it is well to adopt an average compiled from the experience of others until the beginner gets definite data from his own experience.

The second fact is that a percentage that would seem extravagant in one business would really be very economical as applied to another business. Overhead expense is not an arbitrary matter; it is a result. It is influenced by other factors in the total amount of business done. The other factors are cost of material, cost of productive labor and profit. The last item of these is more or less arbitrary and is the one factor that has much influence on the relative percentage of overhead expense. It is my intention to try to show this clearly. I shall try to do this by actual figures secured from various business men, comparing one statement with another.

CASE NO. 1

For the first illustration I propose to take the case of a business run under a practical minimum of actual overhead expense. Somewhat of the history of the case is given, so that the reader may understand the circumstances surrounding it.

Last winter I attended an open meeting of a master plumbers' association at which some non-members were present. While there I was asked to give a chalk talk on "Overhead Expense." In this blackboard demonstration I used the itemized list of expenses, as per the card published by the New Jersey Master Plumbers' Association. A few days later I received a letter from one of the nonmembers who was present, from which the following is extracted:

> "It may be that you and some of the big bugs have 25 per cent. expenses, but that is too much. The other little fellows and myself can beat that all hollow. I have got about all the work I can do and employ a plumber in busy seasons, and sometimes a tinner and can beat you out on any job if you figure 25 per cent. for expenses, as my expenses are much less. Half the items you put on the blackboard cost me nothing. I own my place, get along without a horse and wagon, do my own bookkeeping and make money. You ought to be able to get along with about 10 to 15 per cent. expense. Get next and learn the game."

Recognizing the name as that of a former fellow journeyman worker, I took the matter up with him by letter and later personally, as I also wanted to learn. To my surprise I found that an intelligent set of accounts were kept, simple but understandable, so we could trace all that came in and all that went out. We took one year from January 1 to December 31. The first item was salary. The proprietor in this case did not pay himself a salary, but took amounts for private use as he needed them. These amounts in the year totaled $1050 in round numbers, or about $20 per week. Journeymen's wages in that town were $4 per day, or $24 per week of 44 hours.

OWNER'S SALARY LESS THAN JOURNEYMEN'S

This man gets to the shop at 7 o'clock a. m. and usually leaves for home at 6 or 6:30 p. m., averaging a 66-hour week, and this does not include time on Sunday mornings usually given to book work. He was entitled at journeymen's wages to $1650 for his salary. Nevertheless he drew only $1050. The time he actually spent with the tools on jobs during the year as charged on his books was $546, and he estimated that he spent another $100 worth of time on contracts working with his man. So we subtracted $646 from the pittance of $1050, which left $404 actually charged to overhead expense.

The next item was rent. He could rent his place easily for from $15 to $18 per month, therefore I claimed that $16 per month were chargeable to that item, which was finally allowed. Gas bills were next to nothing in summer and about $1.50 to $2 in winter, so that went down at $1 per month. Heat, which was furnished by a gasoline furnace in the office portion when wanted and a pot stove in the shop, was charged accordingly.

HOW THE OVERHEAD EXPENSE IS KEPT DOWN

He does not have a telephone. The butcher next door takes and sends all messages at a rate agreed between them. He paid the butcher that year $3.80. No horse and wagon is kept, nor does he employ a bookkeeper. His fire and accident insurance cost $48 per year. His taxes are personal only. He has an arrangement with a local cartman by which he secures at a minimum rate the absolutely necessary carting service. All cartage possible is thrown on the supply dealer or house owner. He paid the cartman $18.20 during the year in question.

No account was kept of car fares, but by checking up the various jobs as charged we came to the conclusion that $26 was conservative, in view of the fact that no horse is kept. Tools were bought during the year to replace those worn out and lost. No allowance was made for collection. He collected what he could and let the rest stand and for bad accounts ‘‘he guessed they were all good if he had time to go after them.’’ However, after a bit he admitted that perhaps $20 would cover all the bad jobs he had done that year. Waste materials he had none; everything was used up somewhere or sold to the junk dealer twice a year. I found, however, in a back yard quite a lot of split wrought pipe, some broken tile pipe and other things we all know of, and finally he agreed that he had some waste probably worth about $5. When I mentioned replacing defective goods this made him sore. He was having trouble right then with one source of supply over some iron enameled ware and some closet tank linings, so when he said $50 I cut it down to a conservative $40. He did not lose much on account of lost labor, as he generally charged it up some way. This item might possibly be worth $10 a year. Next week he wrote me: "Have looked into the lost labor question more closely; better make it $25." So I made it $20.

ITEMS THAT WERE NOT CONSIDERED

The matter of allowances on bills at settlement was another item he refused to consider at first, but finally came to the conclusion that he did make some allowances that year, perhaps $5. Regarding interest on capital, he estimated the value of tools and merchandise at $475. Outstanding accounts $416.13. Work done or contracts under way, estimated, $500. Unsettled bills from former years in process of settlement, $375.16; total, $1766.29. Deducting $243.16 for current supply house bills leaves $1523.13. Add to this a business bank balance of $486.75, makes an investment of $2009.88, or $2000 in round numbers, representing the savings of many years of journeyman's work and some 10 years in business. Luckily he was entitled to savings bank interest on this.

Postage and stationery were easily found on his books. Association dues he did not have, as he had never felt that he could afford the cost of membership. Advertising in programs, ball tickets, etc., cost him as scheduled. Then he has a helper. Allowing that he must have a competent helper, he pays him $10 a week. He claims that fully one-half this helper's time is charged to customers, so we charged half of his salary to overhead expense. This made a total overhead cost of $1265.17, divided as follows:

Salary	$404.00
Rent	192.00
Light	12.00
Heat	14.00
Telephone	3.80
Horse and wagon	......
Bookkeeper	......
Forward,	$625.80

Brought forward,	$625.80
Insurance	48.00
Taxes	5.10
Cartage	18.20
Car fares	26.00
Tools	38.75
Collections	......
Back Accounts	20.00
Driver	......
Waste materials	5.00
Replacing defective goods	40.00
Labor lost	20.00
Allowances	5.00
Interest on capital at 6 per cent.	120.00
Postage	10.50
Stationery and printing	7.42
Association dues	......
Advertising	15.40
Boy's time	260.00
Total	$1265.17

The total amount of business done that year was $4983.63, which makes an overhead expense of 25.4 per cent. on the amount of business done.

Proprietor's time in productive labor was	$646.00
Hired journeymen and helpers' productive labor was	285.00
Proprietor's helper's productive labor was	260.00
Total productive labor	$1191.00

which makes an overhead expense of 106.22 per cent. on productive labor.

Productive labor cost	$1191.00
Year's supply bills	2324.11
Total first cost	$3515.11

The overhead expense was thus 35.38 per cent. of the first cost.

First cost	$3515.11
Overhead expense	1265.17
Gross cost	$4780.28
Amount of business done	$4983.63
Gross cost	4780.28
Net profit	$203.35

Showing a net profit of 4.08 per cent. on business done.

Had the proprietor in this case, No. 1, drawn journeyman's wages for the number of hours he actually put in at his business it would have added $600 to his costs, and he would have been about $400 shy of meeting his overhead expenses. Only by working overtime and at less than standard wages was it made possible to show a net profit of a trifle over 4 per cent. Had he, on the other hand, known what he now knows, he would have charged, as he now charges, an added percentage of profit, thus lowering his costs and thereby still more increasing his earnings. In the meantime it would prove very interesting and instructive if the contributor of August 29, who shows an overhead expense of nineteen and a fraction per cent., would go over his accounts and give us the figures worked out in the same manner as is done here.

The second case shows the lowest percentage of overhead expense that has come to my notice. It also shows plainly the fact that a low overhead expense does not necessarily mean a profitable or successful business.

DETAILS OF THE BUSINESS COSTS

The rent charge on the business is small. Including the rent for a stable and lot, the owner pays $18 per month. The amount charged for salary is definite, as the owner withdraws $35 per week for himself, win or lose.

Light and heat he has none. For telephone he pays $52 per year. The work, being mostly all new work, materials are carted by the supply houses. He runs, however, a converted touring car auto-wagon, with which he gets around to the various jobs and carts away the leftovers. This car costs for up-keep $300 per year, as he attends to most of his repairs himself. No bookkeeper is kept. His wife (who was a stenographer and office assistant before marriage) attends to his book work, for which he allows her $5 per week pin money. Insurance, auto insurance, liability insurance on several jobs when the contract called for it, also personal accident insurance, cost him for one year $280. Taxes—personal and licenses in four municipalities, as well as surety bonds—cost for the same year $51. Freight, cartage, etc., $35. Carfares were estimated at $10. Tools: He figures that his tools at the end of the year were worth $200 more than at the beginning, although his bills for tools ran to nearly $300, depreciation being considered against first cost. (This is really wrong; however, I am using his figures and not mine.) Collections last year cost him $10. He estimates losses through bad debts to have been $300. Waste material he estimates at $100. Men are paid by the hour when at work on the job, so there is no lost labor. All the proprietor's time is employed in seeing that men are on the job and only when work is to be done. Allowances for goods claimed not up to the mark are estimated at $100. Interest on capital: Auto is valued at $800, stock and tools at $1200, bank balance $400; total $2000.

As he owes the supply houses as much as is owing him on contracts, there is no cash investment, according to his accounting. Nevertheless, the interest on $2000 at 3 per cent. added to interest paid on notes and cash loans footed up for one year to $380. Postage is estimated at about $25. Stationery and printing bills were $34.60. Association dues: Master Plumbers' and Board of Trade, $24. Incidentals he estimates at $25.

ITEMIZED OVERHEAD EXPENSE ACCOUNT

Salary	$1820.00
Rent	216.00
Light	......
Heat	......
Telephone	52.00
Automobile truck	300.00
Bookkeeper	260.00
Insurance	280.00
Taxes, licenses, bonds	51.00
Cartage, freight	35.00
Car fares	10.00
Tools	200.00
Collections	10.00
Bad accounts	300.00
Forward,	$3534.00

Brought forward,	$3534.00
Driver	....
Waste material	100.00
Replacing defective goods	....
Labor lost	....
Allowances	100.00
Interest	380.00
Postage	25.00
Stationery and printing	34.60
Association dues	24.00
Incidentals	25.00
	$4222.60

Total amount of business done for term covered by this statement, $24,480.

Percentage of overhead expense on business done, 17.25. Paid out in wages other than enumerated in expense, $7240. Percentage of overhead expenses on productive labor, 58.32. Productive labor $7240. Merchandise purchased, $13,597.80. First cost, $20,837. Percentage of overhead expense on first cost, 20.36.

First cost	$20,837.80
Overhead expense	4,322.60
Total cost	$25,160.40
Amount business	24,480.00
Net loss	$680.40

When asked what percentage of profit he had figured to make the proprietor answered: ''All I could get.'' When questioned closer it developed that he usually figured from 15 to 20 per cent. added to first cost. Some jobs where he stood in right had been obtained at 25 per cent. added to first cost, while some, where competition was keen, had been taken at 12 per cent. added to first cost. He had never before this time had a detailed statement of his business affairs nor figured out what his over head expenses were. He, like so many of us, had gone along month after month taking work at low prices because he thought his overhead expenses were practically nothing and because other people were doing that class of work at these low prices; on the theory that to keep moving meant doing business as long as he could cut his expenses.

"When you add 15 per cent. to the cost of labor and material you are losing money."

A BUSINESS OF ANOTHER TYPE

Case No. 3 fits in here very nicely. Like cases Nos. 1 and 2, it is essentially a one-man business. However, in the method of doing business the proprietor in this case certainly works on different lines than the men in the former cases. He does not attempt to do any productive work. While circumstances occasionally demand some small jobs from him personally, they are so few that he does not think it worth while eliminating them from his overhead expenses. He attends to the bookkeeping and buying and to his horse. This keeps him busy from about 7 o'clock a. m. to 5 or 6 o'clock p. m. Of course, he looks after the men and after his jobs, but always in business hours only.

This work he figures is worth $100 per month. On the first of every month when he pays his rent he draws a personal check for $100. In addition to this he drew various sums at different times as he felt that he needed them. The entire withdrawals amounted in the year, under scrutiny, to $1340. He pays $22 a month for a store and small stable and shop in the rear. He had electricity and gas in the shop and stable, a gas soldering pot and small electric welding fixtures. All this cost him $13.60 per annum (the amount looks very small, but we must take the figures as given). Heat: He has a small steam plant, which last year burned four tons of pea coal at $4.80 per ton. His telephone cost $42. For the year his vehicle upkeep, without renewal provisions, cost $336. Insurance, $8.40 for fire and vehicle (very low). Taxes, personal, $4.20. Freight, $6.40. Car fares are estimated at $15 and tools are estimated at $15. Bad accounts, $45.

Driver, nothing. Waste material estimated at $25. Replacing defective goods given at $18.60, labor lost at $15, and allowances at $20.

Interest on capital invested is given at $57. This figures out an investment of $1900, which looks conservative. Stationery and printing, $6, and association dues at $18.

This man certainly is not afraid of a high overhead, as he is well above the average. The peculiar part of this case is that he shows a higher net earning that either of the other cases (one of which shows a net loss), which have a lower overhead.

A comparison with case No. 1 shows a material account of only about $200 more. The difference evidently lies in the fact that this man is not afraid of charging a decent price for his work. The schedule works out like this:

Salary	$1340.00
Rent	264.00
Light	13.60
Heat	19.20
Telephone	42.00
Horse and wagon	336.00
Bookkeeper	......
Insurance	8.40
Taxes	4.20
Cartage	6.40
Car fares	15.00
Tools	15.00
Collections	......
Bad accounts	45.00
Driver	......
Waste material	25.00
Replacing defective goods	18.60
Labor lost	15.00
Allowances	20.00
Interest	57.00
Postage	10.00
Association dues	18.00
Stationery and printing	6.00
Total	$2278.40

Amount of business done	$6965.02
Percentage of overhead expense on business done	32.71
Productive labor	1859.40
Percentage of overhead expense on productive labor	122.88
Productive labor	1859.40
Merchandise	2416.72
First cost	4276.12
Percentage of overhead expense on first cost	53.31
First cost	4276.12
Overhead	2278.40
Total cost	$6554.52
Amount of business done	6965.02
Total cost	6554.52
Net profit	$410.50

which is a net profit of 5.89 per cent. on business done.

This party when questioned writes as follows:

"My business is altogether jobbing. Straight day work and contract jobbing, overhauling, etc. I aim to get an advance of 50 per cent. over cost of labor and material on small work up to $200, and an advance of from 25 to 50 per cent. on larger work, as the size of the job runs. I cannot, and no one else can, do a profitable business on a smaller advance than this. I have tried a lower percentage, and when I did so I obtained more business, but found no greater amount of profit at the end of the year. I aim to make 6 per cent. of net profit over a modest wage for my services, and I find I cannot make it unless I get my price."

This needs no further comment.

The three cases taken up in this article are illustrative of the majority of plumbing businesses. In 1912 the New Jersey State Association of Master Plumbers conducted an inquiry on liability insurance responsibility. According to its report, out of 122 returns received, 60 reported an annual business amounting to between $9000 and $21,000. So it may be said, with a fair assurance of being correct, that from $10,000 to $20,000 is about the amount of business done annually in the average plumbing shop.

In the first three businesses analyzed the proprietor took upon himself the bookkeeping and accounting end as well as the supervision, and in case No. 1 the major portion of the mechanical end also. In the three cases now to be considered the proprietors have their bookkeeping done, give some little time to working with the tools and the remainder to general supervision and estimating. These conditions are such as prevail usually in shops coming under the category of medium size businesses.

However, these three illustrations, taken from actual business books, show a considerable variation in their overhead expense, and a still wider discrepancy in the financial results, for instance the first shows the following items of overhead expense:

Salary	$1375.00
Rent	300.00
Light	12.00
Heat	25.00
Telephone	60.00
Horse and wagon	300.00
Bookkeeper	384.00
Insurance Taxes	100.00
Cartage Car fares	10.00
Tools	15.00
Collections	25.00
Bad accounts	100.00
Driver (boy and owner)	50.00
Waste material	25.00
Replacing defective goods	25.00
Labor lost	25.00
Allowances	10.00
Interest on capital	90.00
Postage	25.00
Stationery and printing	25.00
Association dues	14.00
Total	$2995.00

Inquiry elicited the fact that absolutely accurate accounts were not kept, that is they were not kept separately. The figures, however, are vouched for as being within a few dollars, having been picked out of the general account, no attention being paid to the odd cents.

When the owner's attention was called to this showing he was astonished. It surely is now up to him to ask a better margin of profit for his work. His overhead expenses are below the average, the various items making up the schedule are about as low as they can be bought for, but the man has been selling his goods entirely too cheap.

Total amount of business done		$14,500.00
Amount of overhead expense		2,995.00
Percentage of overhead expense on business done		20.65
Productive labor		4,600.00
Percentage of overhead expense on productive labor		65.11
Productive labor	$4,600.00	
Merchandise	7,500.00	
First cost	$12,100.00	
Percentage of overhead expense on first cost		24.75
First cost	$12,100.00	
Overhead expense	2,995.00	
Total cost	$15,095.00	
Business done	14,500.00	
Net loss	$595.00	or 4.1%

Case No. 5 is that of a medium-sized business in a medium-sized city, the proprietor of which is a thorough mechanic, being a graduate of the New York Trade School. He also has had the teaching of adversity and experience in business life. He took over his business from a relative when it was virtually bankrupt and has put it on a paying basis, the result showing that he must have added on the average 31.2 per cent. to the cost in order to have cleared a net profit of 5.3 per cent. I understand that this man aims to obtain 50 per cent. over gross cost and probably some of the competition contract work, where he had to meet other men's figures brought the net percentage down. The figures given by him are as follows:

Salary	$1300.00
Rent	360.00
Forward,	$1660.00

	Brought forward,	$1660.00
Light Heat		72.00
Telephone Bookkeeper Postage Stationery and printing	Office expense account	523.00
Horse and wagon Cartage and driver		470.00
Insurance		100.00
Tools		34.00
Collections Bad accounts Waste material Replacing defective goods Labor lost Allowances Interest	General expense account	658.00
Association dues		31.00
Advertising		51.00
Total		$3599.00

NOTE.—The grouping of items is due to the manner of accounting in vogue in this business. Here also the pennies were eliminated to make the figuring easier.

Amount of business done		$17,000.00
Amount of overhead expense		3,599.00
Percentage of overhead expense on business done		21.17
Productive labor		4,500.00
Percentage of overhead expense on productive labor		79.97
Productive labor	$4,500.00	
Merchandise	8,000.00	
First cost	$12,500.00	
Percentage of overhead expense on first cost		28.79
First cost	$12,500.00	
Overhead expense	3,599.00	
Gross cost	$16,099.00	
Amount of business done	17,000.00	
Net profit	$901.00	or 5.3%

These figures show a paying business run with every care as to the overhead expense and with no extravagant salary list, still the percentage of overhead expense is higher on all points than that of the previous case, while the amount paid out for productive labor is a little lower and the merchandise account a little higher, the evident cause of the difference in results being the difference in the amount of profit added and obtained.

Another case is that of a brother partnership, where a stove and tinware store is run in conjunction with a plumbing shop. The charges on overhead expense are estimated on percentage of services rendered, the rent on comparative floor space occupied. The salary is that of one brother who has entire charge of the plumbing department less the time charged to jobs direct. This is interesting, as many plumbers, especially in small towns, have similar combinations, the claim often being made that by this method they keep down their overhead expenses. The comparison of results does not bear out this claim, just as in cases Nos. 1, 2 and 3, we find a refutation of the claim that a man doing all his own work, bookkeeping, etc., has little or no overhead expense.

The actual figures show that while the actual cost of doing business is lower, the percentage it bears toward the other factors, namely, business done, productive labor and net cost is often higher. The question hinges entirely on the amount or percentage of profit that is added to the net cost, taking into consideration the overhead expense and the amount of business done.

Salary	$1476.80
Rent (⅓)	312.50
Gas (⅔)	13.36
Heat (½)	25.00
Telephone (½)	58.00
Auto, horse and wagon (½)	210.00
Bookkeeper (½)	403.00
Insurance (⅓)	31.27
Taxes (⅓)	87.50
Cartage (½)	6.00
Car fares (¾)	113.00
Tools (on shop)	100.00
Forward,	$2836.43

Brought forward,		$2836.43
Collections (¾)		35.00
Bad accounts (on shop)		20.00
Drivers (½)		300.00
Waste material (on shop)		26.00
Replacing defective goods (on shop)		52.00
Labor lost (on shop)		78.00
Allowances (on shop)		72.00
Interest (on shop) tools and merchandise		208.00
Postage (¾)		40.62
Stationery and printing (½)		29.67
Association dues		40.00
Advertising (½)		81.26
Total		$3818.98
Amount of business done		$14,960.88
Amount of overhead expense		3,818.98
Percentage of overhead expense on business done		25.52
Productive labor		4,350.00
Percentage of overhead expense on productive labor		87.79
Productive labor	$4,350.00	
Merchandise	7,684.00	
First cost	$12,034.00	
Percentage of overhead expense on first cost		31.79
First cost	$12,034.00	
Overhead expense	3,818.00	
	$15,852.98	
Amount of business	14,960.88	
Net loss	$892.10	or 5.98%

On these results being brought to the attention of the proprietors, they informed me that last year was an off year with them on the shop end of the business, that their business during the five years preceding had run several thousand dollars higher, one year showing as high as $20,000 worth of business done, with the same fixed charges and only a few hundred dollars more on the productive labor and merchandise accounts.

We have, therefore, in this case an example of too much plant—stock, office and tools—for the amount of business done last year, or it may be that the owners took some contracts during last year at too close a price. The fact that their productive labor and merchandise accounts were only a few hundred dollars higher, while the total amount of business done was thousands higher in previous years, leads me to designate this as being the "nigger in the wood pile."

A business showing results which are much more encouraging is taken as the next example. It is evident that the owner knows how to run his business and there is food for thought in the difference of the final showing with that of the other cases already considered. The figures follow:

DETAIL OF OVERHEAD EXPENSE

Salary		$2000.00
Rent		196.00
Light		12.00
Heat		20.00
Telephone		80.00
Horse and wagon		200.00
Bookkeeper		416.00
Insurance		88.00
Taxes		10.00
Cartage		5.00
Car fares		10.00
Bad accounts		50.00
Driver		520.00
Waste material		15.00
Labor lost		20.00
Replacing defective goods		15.00
Allowances		.....
Interest on capital		90.00
Postage		25.00
Stationery and printing		70.00
Association dues		16.00
Donations		15.00
Total		$3873.00
Amount of business done		$14,990.00
Amount of overhead expense		3,873.00
Percentage of overhead expense on business done		25.81
Productive labor		4,428.00
Percentage of overhead expense on productive labor		87.48
Productive labor	$4428.00	
Merchandise	4630.00	
First cost	$9058.00	
Percentage of overhead expense on first cost	49.98	

First cost	$9058.00
Overhead expense	3873.00
Gross cost	$12,931.00
Net profit	$2059.00 = 13.73 per cent. of business
Amount of business	$14,990.00
Net cost	$9,058.00

SUMMARY

Overhead expense	25.81%	$3,873
Labor	29.54%	4,428
Merchandise	30.88%	4,630
Profit	13.73%	2,059
	99.96%	$14,990

The fact that in these cases the amounts chargeable to productive labor and to merchandise are so near alike, while the results are so different leads me to present them for comparison. The concluding instalment of this study will present three cases of what may be termed large businesses and a comparison of the three classes of plumbing businesses investigated.

The three cases hereinafter discussed are such as come under the category of large business. The first thing that attracts attention is that the overhead cost of doing business is much lower than in those businesses previously considered. The percentage of net profit shown is also lower excepting in case No. 10, where it is higher than those in the small business and medium business class. Case No. 8 is that of a mixed business, about one-half being new construction and one-half reported as being high-class jobbing, father and son being partnership proprietors.

DETAILS OF EXPENSE ACCOUNTS

Salary—owner and son	$3800.00
Rent—shop and stable	1300.00
Light	46.00
Heat (included in rent)	.....
Telephones	96.00
Forward,	$5242.00

Brought forward,	$5242.00
Horse, wagon and autoes	1420.00
Bookkeeper and assistants	2300.00
Insurance—fire, vehicle and liability	380.00
Cartage	......
Car fares	30.00
Taxes and licenses	60.00
Tools and machinery	300.00
Collections and legal expense	150.00
Bad accounts	400.00
Allowances	150.00
Drivers and stableman	1320.00
Waste material	50.00
Replacing defective goods	150.00
Interest on capital and commercial	180.00
Postage	45.00
Stationery and printing	75.00
Association dues	24.00
Incidentals (general expense)	150.00
	$12,426.00

SYNOPSIS OF THE YEAR'S BUSINESS

Amount of business done	$72,130.00
Amount of overhead expense	12,426.00
Percentage of overhead expense on business done	17.22
Productive labor	26,043.00
Percentage of overhead expense on productive labor	47.71
Merchandise	30,601.00
First cost	56,644.00
Percentage of overhead expense on first cost	21.93
Amount of business done	72,130.00
Gross cost	69,070.00
Net profit	$3,060.00
Percentage of net profit on business done	4.24

Case No. 9 is that of a business in a large city in the Middle West. The business on the death of the original owner was incorporated by the son and an old employee, the son acting as general manager and office head, the erstwhile employee acting as superintendent, having charge of the mechanical and outside end. The year the report is on showed about 90 per cent. new construction work and 10 per cent. repair work. The overhead expense schedule shows the following:

Comparative Overhead Expense Statements

SCHEDULE OF OVERHEAD COSTS

Salary of manager		$2500.00
Salary of superintendent		2300.00
Light Heat Telephone Bookkeeper Postage Stationery and printing	Office expense	2910.00
Horses and wagons Cartage Car fares Tools Driver	General expense	3876.00
Rent		1300.00
Insurance		450.00
Taxes Collections Licenses Replacing defective goods Allowances Association dues Interest on notes	Special expense	2420.00
Bad accounts (profit and loss charge)		240.00
Waste material—estimated		250.00
Labor lost—estimated		100.00
Interest on capital (3 per cent. on $5,000)		150.00
Depreciation (profit and loss charge)		500.00
Total		$16,966.00

SYNOPSIS OF BUSINESS

Amount of business done	$98,560.00
Amount of overhead expense	16,996.00
Percentage of overhead expense on business done	17.24
Amount paid out for productive labor	38,465.00
Percentage of overhead expense on productive labor	44.18
Merchandise	41,300.00
First cost	79,765.00
Percentage of overhead expense on first cost	21.30
Amount of business	98,560.00
Gross cost	96,761.00
Net profit	$1,799.00
Percentage of net profit on business done	1.82

The foregoing shows one of the results of expansion by taking a large amount of business at a very close margin on the theory that the larger the business the smaller the overhead expense and consequently the larger the profit must be. The year after the death of the original owner this firm did only $53,000 worth of business, with a 24.84 per cent. overhead expense and cleared a profit of 9.12 per cent. The new owners felt that it was up to them to expand, as the manager expressed himself, it was up to him to make good. He figured that they could do a great deal larger business with their existing plant without increasing their fixed charges. Therefore, their overhead expense percentage would be lower, and consequently they could take work at a considerably lower price and still make a larger percentage of profit.

The following year showed $70,864 worth of business with 20.27 per cent. of overhead and 5.32 per cent. of profit. This was not the result anticipated. However, he felt that he was right in principle and decided to expand some more. The following year showed $129,452 worth of business, with 13.72 per cent. of overhead expense and 7.65 per cent. of profit. During this year the flexible items of the overhead expense had risen on account of the rising volume of business, for, whereas, in 1909 the total amount of overhead expense had been $13,761, in 1911 it was $17,760, an increase of $4000. The following year he felt that they were carrying too large a volume of commercial paper and too large an outstanding account, and found it necessary to pull in a little. He tried to get a little better price for their work in 1912 and consequently obtained less work. The plant, being expanded, was consequently a little topheavy. Prices were again pinched in an effort to catch up, and 1912 consequently showed $98,560 worth of business, with a 17.24 per cent. overhead and 1.82 per cent. profit.

Case No. 10 shows the best net results of this series. It is the record of a large jobbing and overhauling business, absolutely no new construction work having been done during the year reported on, which was 1912. The schedule is as follows:

DETAILS OF COST ACCOUNTS

Salaries of management	$1820.00
Rent	1200.00
Light	14.60
Heat	52.00
Telephone	100.00
Horse, wagon and auto	859.82
Bookkeepers	919.50
Insurance (including liability)	345.83
Taxes (City, State and Federal)	111.40
Cartage	2.00
Car fares	250.00
Tools (replacement and depreciation)	413.57
Collections	......
Bad accounts	178.30
Driver	728.00
Waste material (estimated)	150.00
Replacing defective goods	50.00
Labor lost (estimated)	200.00
Allowances and discounts	502.99
Interest on capital, 3 per cent. on $5,000 estimated	150.00
Postage	144.95
Stationery and printing	94.82
Association dues	24.00
Advertising, charities, license fees and petty repairs to vehicles	298.55
Total	$8610.33

SYNOPSIS OF BUSINESS FOR 1912

Amount of business done	$54,037.47
Amount of overhead expense	8610.33
Percentage of overhead expense on business done	15.93
Amount of productive labor	17,494.26
Percentage of overhead expense on productive labor	49.22
First cost	36,113.44
Percentage of overhead expense on first cost	23.84
Merchandise	18,619.18
Amount of business done	54,037.47
Gross cost	44,723.77
Net profit	9,313.70
Percentage of profit on business done	17.23

This case No. 10 proves up like this:

Overhead expense	15.93%	$8,610.33
Merchandise	34.45%	18,619.18
Labor	32.37%	17,494.26
Profit	17.23%	9,313.70
Year's business	99.98%	$54,033.47

The apparent loss of 0.02 of 1 per cent. in the proof comes through not having carried the calculations of percentage beyond two decimal points. Had they been carried to their ultimate conclusion the 0.02 of 1 per cent. would have been made up. The managing proprietor in this case is one of those absolutely honest, hard-working individuals of which the craft has so many. That his results are quite above the average, both as regards amount of business and financial returns, is entirely due to individual competency, and to the fact that he knows how to do business as well as how to do plumbing work. In the next and final installment will be shown a comparative table of the different businesses discussed.

COMPARATIVE OVERHEAD EXPENSE STATEMENTS

Summary of Returns Made by Ten Business Men Showing Annual Costs and Profits on Business Varying Between Four and One Hundred Thousand Dollars

By B. F. Henry

In tabulating the experiences that have been used for these articles cases No. 1 to 8 are presented inclusive and case No. 10 and No. 9 separately, as having four years' experience to hand on the last case, affords opportunity for information of a character not disclosed in the other cases.

The first thing that attracts attention is the fact that there does not seem to be any co-relation between overhead expense percentage and profit percentage. Case No. 1 with 25.4 per cent. overhead expense shows 4.09 per cent. profit, No. 6 with 25.52 per cent. overhead expense shows 5.96 per cent. loss and case No. 7 with 25.83 per cent. overhead expense shows 13.73 per cent. profit. Case No. 2 with 17.65 per cent. overhead expense shows 2.77 per cent. loss, and No. 8 with 17.24 per cent. overhead expense shows 4.24 per cent. profit. It appears from this that the influence of overhead expense on profit is not empirical.

The next proposition appearing is the apparent fact that overhead expense varies considerably in accordance with the character of business and that the dominating factor influencing overhead expense and all other percentages, in fact, governing even the total amount of business done, is designated in line No. 10, viz., percentage added to first cost, first cost being merchandise cost plus productive labor.

For instance, case No. 4 shows:

Amount of business	$14,500
First cost	12,100
Percentage overhead expense on business	20.65
Percentage loss on business	4.1
Percentage added to first cost	19.83

Now if 36 per cent. had been added to first cost, the result would have been as follows:

First cost	$12,100
36 per cent.	4,356
Amount of business	$16,456
Total	15,095
Profit	$1,361
Amount business	$16,456
First cost	12,100
Percentage overhead expense on business	18.2
Percentage profit on business	8.27
Percentage added to first cost	36.

On the other hand, case No. 5 now shows:

Amount business	$17,000
First cost	12,500
Percentage overhead expense on business	21.17
Percentage profit on business	5.30
Percentage added to first cost	36.

Had the owner added only 20 per cent. to first cost the result would have been as follows:

First cost	$12,500
20 per cent.	2,500
Amount business	$15,000
Total cost	16,099
Loss	$1,099
Amount business	$15,000
First cost	12,500
Percentage overhead expense on business	23.99
Percentage loss on business	7.32
Percentage added to gross cost	20.

The percentage as per lines No. 12 and 13 would change accordingly. Those of lines No. 16, 17 and 18 would remain as they are.

I have used these two cases No. 4 and 5 for this comparison because the stable or uncontrollable factors (merchandise and productive labor comprising the first cost) are practically the same, being $12,100 in case No. 4 and $12,500 in case No. 5. The variant or controllable factor, namely, percentage added to gross cost, is the one factor that turns profit into loss or loss into profit. It dominates the overhead expense percentage, no matter if we estimate overhead expense on total amount of business done, on productive labor, on merchandise or on first cost. The amount (not percentage) of overhead expense is governed by local circumstances, by character of business, by the personality of the proprietor and by firmly established business conditions. We find in these cases that, for instance in case No. 4, $12,100 worth of labor and material carried $2995 of overhead expense, while in case No. 5, $12,500 worth of labor and material carried $3599 of overhead expense, a difference of $400 in first cost carrying a difference of $604 of overhead expense.

All this shows us that it is not safe for any man to estimate on any computed average of overhead expense. It is absolutely necessary that we find out each year what our actual overhead expense is and govern ourselves accordingly. For those who have no experience to guide them, we can only say that for businesses below $10,000 the average expense shows upward of 25 per cent. Between $10,000 and $25,000 the averages run between 20 and 25 per cent., while above $25,000 they run from 13 to 20 per cent.

Lines No. 3 and 4 also show a wide discrepancy, no hard and fast rules being deducible therefrom further than this general fact, that according as job work or new construction work dominate in any shop, so will labor or merchandise be the larger factor.

Lines No. 11, 16, 17 and 18 show the different percentages that must be provided for accordingly as one wishes to load his overhead expense on any one or another item composing the total business or on the total business itself. To take up the advantages or disadvantages of these various methods would need a separate treatise.

TABLE NO. 1

	Case No. 1	Case No. 2	Case No. 3	Case No. 4	Case No. 5	Case No. 6	Case No. 7	Case No. 8	Case No. 10
Amount of 1-year business (1)..	$4,983	$24,480	$6,965	$14,500	$17,000	$14,960	$14,990	$72,130	$54,037
Amount overhead expense (2)..	1,265	4,322	2,278	2,995	3,599	3,818	3,873	12,426	8,610
Amount paid out for productive Labor (3) ..	1,191	7,240	1,859	4,600	4,500	4,350	4,428	26,043	17,494
Amount paid out for Merchandise (4)	2,324	13,597	2,416	7,500	8,000	7,684	4,630	30,601	18,619
Productive Labor Merchandise, 1st Cost (5).	3,515	20,837	4,276	12,100	12,500	12,034	9,058	56,644	36,113
Productive Labor Merchandise, overhead expense (6) ...	4,780	25,160	6,554	15,095	16,099	15,852	12,931	69,070	44,723
Net profit (7)..	203	...	410	...	901	...	2,059	3,060	9,313
Net loss (8) ..	...	680	...	595	...	892	...	...	...
Amount Business less first cost (9)	1,468	3,643	2,689	2,400	4,500	2,926	5,932	15,486	17,924
Percentage added to first cost (10)	41.76	17.48	62.88	19.83	36.00	24.31	65.48	27.34	49.63
Percentage overhead expense of business (11)	25.40	17.65	32.71	20.65	21.17	25.52	25.83	17.24	15.93
Percentage Merchandise of business (12).	46.62	55,54	34.68	51.72	47.50	51.36	30.88	42.42	34.45
Percentage Labor of business (13)	23.90	29.57	26.69	32.41	26.47	29.08	29.54	36.15	32.37
Percentage Profit of business (14)	4.09	.....	5.88	.....	5.30	.....	13.73	4.24	17.23
Percentage Loss of business (15)	.....	2.77	.....	4.10	.....	5.96	.....	.....	.....
Percentage overhead expense estimated on P. Labor (16).	106.22	59.69	122.54	65.11	79.97	87.79	80.26	47.71	49.22
Percentage overhead expense estimated on Merchandise (17)	54.43	31.78	94.29	39.93	44.98	49.68	83.65	42.31	46.24
Percentage overhead expense estimated on first cost (18).	35.99	20.70	53.27	24.75	28.79	31.79	40.94	21.93	23.84

So long as the overhead expense is provided for, that is the important matter.

Look now at case No. 9 covering four years of business experience.

All that has been said of the tabulation is emphasized in this showing. The domination of line No. 10 is even more accentuated as the influence of personality remains the same. It shows plainly the fluctuating results of an attempt at business expansion. It might be noted in passing that the desire on the part of the firm to gobble a very large share of the work in that town resulted in a contraction in business on the part of the other five firms in the town. In order to get their share of the work they also started to cut. The result is shown in the last year's business. Each year our friends cut down the percentage added to the first cost in order to get more business. The other fellows also cut. Our friends had to cut still more until in 1912 they came perilously near to getting into the "loss" class. It will be very hard for them to get back to the standard of business enjoyed in 1909. In other words, they have demoralized the business in that town for themselves and all others for some time to come.

TABLE NO. 2

Case No. 9

	1909	1910	1911	1912	Av'ge for 4 Yrs.
Amount 1 year's business (1)......	$53,236	$70,864	$129,452	$98,560	$88,028
Amount overhead expense (2)......	13,761	14,364	17,760	16,996	15,720
Amount Paid out for Productive Labor (3)....................	16,406	24,476	48,320	38,465	31,917
Amount Paid out for Merchandise (4)	18,214	28,248	53,480	41,300	35,310
First Cost (5).......................	34,620	52,724	101,800	79,765	67,227
Total Cost (6).......................	48,381	67,088	119,560	96,761	82,947
Net Profit (7)	4,855	3,776	9,892	1,799	5,081
Net Loss (8)........................	......	......	......	......	......
Amount Business less First Cost (9)	18,616	18,140	27,652	19,795	20,801
Percentage Added to First Cost (10)	53.77	34.59	27.16	23.56	30.90
Percentage overhead expense of business (11)	25.85	20.27	13.72	17.24	17.85
Percentage Merchandise of business (12)	34.21	39.86	41.31	41.90	40.11
Percentage P. Labor of business (13)	30.82	34.53	37.32	39.20	36.25
Percentage Profit of business (14) ...	9.12	5.32	7.65	1.82	5.77
Percentage loss of business (15)....	.....	.....	.....	.....	.....
Percentage overhead expense estimated on P. Labor (16)........	83.87	58.68	36.75	44.18	49.25
Percentage overhead expense estimated on Merchandise (17)........	75.55	50.85	33.21	41.15	44.50

The last column is added to emphasize the fallacy of averages, as only one year out of the four approximates the average results, that year being 1910.

Again it might be said that the law of averages is of use only for those who have no personal experience to guide them. Each year brings its own problems and each year will demand different treatment according to local conditions, according to personal financial conditions, and according to the size of the plant and the character of the work.

How very important then does it appear to be that we should know each year what our overhead expense has been, what our year's business has brought forth in the line of net profit or loss. Without this knowledge we are only guessing.

Very interesting, however, is the application of the information deduced from the foregoing tables when applied to general business conditions.

Of 122 shops reporting for the term July 4, 1911, to July 4, 1912:

Four report between $2000 and $5000 worth of business.

Sixteen report between $6000 and $10,000 worth of business.

Thirty-seven report between $10,000 and $20,000 worth of business.

Twenty report between $20,000 and $30,000 worth of business.

Fourteen report between $30,000 and $40,000 worth of business.

Four report between $40,000 and $50,000 worth of business.

Ten report between $50,000 and $75,000 worth of business.

Eleven report between $75,000 and $100,000 worth of business.

Six report over $100,000 worth of business.

If this average holds good throughout the trade (and we have no reason to think otherwise) the large majority of plumbing businesses are about $18,000 in size. The average overhead expense, according to the cases reported, in a business of this size is from 20 to 25 per cent.

and as of these the numerical preponderance is between $10,000 and $20,000, the average overhead expense can safely be stated as being nearer 25 than 20 per cent. For businesses below $10,000 all indications point to an average of about 23 to 30 per cent. So we estimate that 75 per cent. or three-quarters of the plumbers are carrying an overhead expense of about 25 per cent. The other 25 per cent., or one-quarter, run down from 20 to 13 per cent. overhead expense, according to the amount and character of the business done.

Nowhere do we find any justification for adding 10 per cent or 15 per cent to first cost (labor and material) with the expectation of showing a net profit. It just can't be done.

ANALYZING THE POSSIBILITIES OF A BUSINESS

Experience of Two Men Who Contemplated Purchasing a Business and Who Made a Close Study of the Possibilities from Meagre Data

By R. B. L.

In view of the interest that has been taken in the recent proposal of a young man entering the plumbing business to charge his overhead expenses to his various contracts in proportion to the amount of labor involved, and the real value that an exposition of such business principles as were outlined by the various commentators possesses to embryo business men, it seems to me that my efforts to get at the profit-bearing possibilities of a plumbing and sheet metal business recently in the market owing to the death of the proprietor should have some interest to others ambitious to become owners of a like business.

Here were my qualifications to take up the business: A long practical experience as a foreman plumber, the ability to measure architects' plans correctly, an acquaintance with the main principles of business gained through reading the trade papers and through observation.

I knew of a man with similar qualifications in the sheet metal business who would make an ideal partner if he would only come in, and with that in mind I started out to make inquiries as to the terms upon which the business would be sold by the executors of the estate. What I found out about it is best shown in the following letters to and from my tinner friend:

''Friend Johnson:

''When I worked beside you up in Massachusetts you often used to say that you thought we two together could handle a good sheet metal and plumbing business and make money. It happens that there is one for sale now and I have taken the trouble to find out what it is worth. If you feel like taking a chance on it after reading what I have to say let me know and I will be ready to go further into the matter.

"Here is the proposition: The business is an old one and the owner made all the money he possessed in it. He died only a few weeks ago and his widow thinks the best thing to do is to sell out. While the old man used to do an average annual business of some $20,000 it has fallen off considerably of late, chiefly because he was too old to get out and hustle for new work and practically all he has been doing for a few years is jobbing work and such contracts as came his way without effort on his part.

"Even then there is still a business of about $14,000 being done, but it is done in the old-fashioned happy-go-lucky way, and I was quite unable to get at the exact profit that the business makes. All that I can base my conclusion upon that it is profitable is that it has always yielded a comfortable living and showed a balance at the end of the year after all the bills were paid so that the old man had something to put away in his stocking. I have, however, estimated the possibilities as best I could from the figures available, and here is how things stand.

"First of all, let me say that I have very little capital free, and that before making any proposition I inquired as to the terms upon which the business could be bought. It may interest you to know that if the right man with the right credentials takes hold of it the executor will allow the capital tied up in stock and tools to remain at 6 per cent. on the understanding that a reasonable reduction is made yearly from the profits until the sum is cleared off. The new owner will have to provide all the working capital he requires and of course will have to give the executor some security for the capital represented by the stock.

"The value of the stock, which is all in pretty good shape, is about $6000. The shop is a good one, and very well equipped. In fact, it is about as good a shop as I have seen in a long time, and the sheet metal tools and facilities for doing a large business are of the best. The plumbing shop is also a good one, as the whole place was built to the old man's plan, and designed especially for the business. The store is big and there is a convenient office, but maybe the store is somewhat of a white elephant, as you will see later. The stock in the store is of a medium grade and consists of stoves, furnaces, a line of enameled kitchen ware, sundry house furnishings and a few examples of medium class plumbing fixtures with the usual assortment of brass work.

''The value of the stock, I was assured, is about the same as it has been for a number of years, as only enough of each line has been bought to keep things running for a number of years. But as no inventory has been made for three years a good deal of what I have to tell you must be taken with faith in the honesty of the old man, and now of his executor. However, I see no reason to doubt any of the statements made.

''The number of men employed has been off-and-on six. The wage scale is $3.50 a day for plumbers and $3.25 for tinners. The price charged by all the shops in town is 70 cents an hour for plumbers and 60 cents for tinners. There is an auto-truck in good shape in connection with the business and the men look to be capable fellows.

''The only figures I could get on the volume of business and the costs of doing it were as follows, there was absolutely no record of how much was charged as overhead if any allowance was made at all.

Paid for labor, including bookkeeping and time of one of the men in store occasionally	$5,590.00
Stock purchased for one year	4,187.00
	$9,777.00
Goods sold in the store	$1,263.78
Work charged on books for one year	12,706.76
	$13,970.54

“The rent of the store and workshop would be $50 a month, so that would be the chief item of expense. The following table will show what I have estimated the rest to be and what the profit left over might be at the end of the year if only the present amount of business were done. Perhaps you will think that I have allowed a very small sum for bad debts, but I am assured that these did not average up to that amount during the whole time the old man was in business, so I am taking a chance at that sum. The rest may be a bit off, but it is as near as I can figure it. After reading it take some time to consider the matter and see if you would not like to come and handle the sheet metal end as a working foreman until I could make it worth your while to take that end as manager. If you want to put some money in along with me now, of course you will get your share according to the amount invested. I figure that I will need $2000 to handle the business for a while, at least, and if it grows can use more.

ESTIMATED POSITION OF PLUMBING BUSINESS

“It is understood that valuation of stock is approximately same as in 1912.

“Known income:

Cash sales	$1,263.78	
Book charges	12,706.76	
		$13,970.54

“Known expenses:

Total labor costs	$5,590.12	
Material purchased	4,187.00	
	$9,777.12	
Deduct estimated non-productive	590.00	
		$9,187.12

“Estimated overhead expense:

Bookkeeping and tending	590.00
Rent of store and shop	600.00
Telephone and telegrams	45.00
Forward,	$1235.00

Brought forward,	$1,235.00		
Postage, stationery, advertising	200.00		
Upkeep of car and tools	200.00		
Bad debts	250.00		
Association dues and expenses	40.00		
Lighting and heating	50.00		
Car fares and freight and incidentals	250.00		
Manager's salary	1,500.00		
		$3,725.00	
		$12,912.12	
Apparent balance	$1,058.42		= 7½% on sales
Required to pay 6% on $6000	360.00		
Balance	$698.42		
Overhead expenses	$3,725.00		= 27% of sales

"You will see by my prospectus that I think the business ought to yield a pretty good return on the working capital after paying the $360 on the old man's stock and that the amount allowed for overhead expenses works out at about 27 per cent. This is somewhat high, but it could be kept down to that, I think, and if the volume of business went up the percentage would be lower, of course. You will see that I am allowing myself a salary of $1,500 for management, but as I would have to do probably 12 hours a day most of the time, I think that is little enough to take out.

"Tell me what you think of the proposition and if it appeals to you.

"Yours,

"B."

"Boston, Mass.

"DEAR BERT:

"I was surprised and pleased to hear from you and have seen no reason so far to change my opinion as to the chances we would have in business together. Unfortunately I am not able to put very much into a business like that, either, so could not hope to come in on equal shares if you required more than $2000. I could go half of that, though, if it looked good to me, and at first sight your proposition did. After considering it, however, I came to the conclusion that there was not so much in it as appeared.

"For instance, it seems to me that the proportions the labor cost and the cost of material purchased bear to each other are wrong somehow. I think that more material than that ought to be sold if it costs $5590 for labor. The conclusion I draw is that the labor is costing too much by reason of waste time, or else the prices charged to the customers have been padded unmercifully. If the latter is the solution then it may account for the dropping off in business. If the former, then some of the help would be due to leave suddenly. Assuming that 20 per cent. profit was made on the wage outlay, and I don't suppose that it would average up more than that in the end, the return from that would be $6987. If that amount is deducted from the gross amount taken from the journal and cash sales record of $13,970, it is plain that a profit of $2796 has been asked, and this to me seems exorbitant on material costing $4187. I may be wrong, of course, but would like to have you set me right if so, and then I can think the thing over again. At least I am interested, and nothing would give me greater pleasure than to be able to come with you on either the conditions you name or as a full partner if that were possible. I am quite agreeable in either case to the amount you allow as manager's salary. It would be worth every cent of it if the thing promised as well as you seem to think.

"As ever,

"J. J."

"FRIEND JOHNSON:

"I am glad to hear that you are interested in the proposition and that if I can show you, you are ready to come in. Well, now I am not over enthusiastic on the thing as it stands, to tell you the truth, but what appeals most to me is the fact that a larger business ought to be done on the stand. The shop is there and the old customers are there, and surely it is possible to bring in new ones enough to increase the volume of business so that the running expenses will be lower.

"I do not want to throw a wet blanket over the proposition, you know, especially as it was I who brought the thing up, but the present running expenses seem too high to give us a fair show in competitive work, and on looking over my list again I am not sure that I allowed enough for some of the items. But your way of getting at the profits is interesting, and I mentioned the overhead expense first so that you would understand that it has to be considered in the profits. When you estimated the profit on the labor you did not allow even enough to cover this item. Then on the material you can see that when you estimate the gross profit allowance has to be made for the running costs first. You can figure it another way, however, and see how it pans out.

"If $5590 were paid in wages it would probably be a fair average if the ratio was taken as $3000 for the plumbing end and the rest for the sheet metal branch. Now see how this comes out. The regular charge for plumbing work on labor is 70 cents an hour, and for tinning 60 cents an hour, as I think I told you in my first letter. Therefore, we would get about 6666 hours' labor, or almost a year's work of three plumbers for the $3000, and 6475 hours' labor, or almost a year's work of three tinners for the balance of $2590. Charged up at the above prices, this labor would return $4666 and $3885, respectively, or a total of $8551. If a profit of 25 per cent. were asked on the material sold, as represented by the amount purchased, that would return approximately $5450. Add these together, and the total returns are $14,000, which comes pretty near to what I was told was the volume of business for the past year.

"These are the prices which would be charged in the present way of conducting the business, neglecting altogether the matter of overhead expense, but you can see that there is enough margin to take care of the 27 per cent. that I estimated and that it is spread over the labor as well as the stock charges. If there had been a less margin of profit on the labor your contention that an excessive price was charged for stock would have been pretty nearly right, but as it is the price asked is no greater than that asked by the other shops. You can think it over again and let me know your decision in a week or so.

"B."

"Friend Johnson:

"While we have been corresponding back and forth over this matter of buying the business in ——— we possibly have been getting some profit out of it, but I am sorry to say that we are not going to get any more. I have today received a letter from the executor to the effect that he has decided to keep the business running for the benefit of the widow, and that he has appointed one of the men who has worked there for a long time as the manager. You may be sure that if anything turns up again I will let you know of it.

"B."

A CONCRETE EXAMPLE OF COST OF DOING BUSINESS

Figures Taken from Books of a Plumbing, Heating and Sheet Metal Contractor—Items Which Go to Make Up Overhead Expense

A CONCRETE example of the cost of conducting a plumbing and heating business is submitted by a subscriber to *Metal Worker, Plumber and Steam Fitter,* so that readers may have an opportunity to study and discuss the figures given which are taken from the actual records of the company for a year. This company conducts a general plumbing, heating and tinning business.

The volume of the firm's business for the fiscal year ending March 31, 1913, was $40,056.19. The total sum of expenses was $7842.25, made up of the items listed in the accompanying table.

The firm is composed of two members, each of whom withdrew from the receipts of the firm $1,800, which, added to the items enumerated above, make the total first mentioned. With these figures it is easy to determine our cost for the fiscal year ending March 31, 1913, which is a fair average for the entire time we have been in business. The percentage of cost without the salaries of the members of the firm is 10.55 per cent., and the percentage after adding the salaries is 19.53 per cent.

ITEMS OF ANNUAL EXPENSES

Insurance	$85.00
Incidentals	534.53
Telephone and telegraph	90.00
Automobile, which includes repairs and oil	153.12
Fuel	62.00
Rent	525.00
Freight and drayage	150.00
Gasoline and oil for shop engine	75.00
Interest	668.93
Forward,	$2343.58

Brought forward,	$2343.58
Advertising	39.40
Gas	51.94
Postage and stationery	130.38
Horse and wagon	256.66
Taxes	86.29
Salaries of non-producing employees	1316.00
These items making a total of	$4224.25

A great many persons hold the opinion that the salaries or cash withdrawals of the members of the firm should not be added to other expenses when calculating the percentage of cost, and others think they should be; hence we give percentages determined in both ways.

In explanation of the items enumerated above, we wish to say that the item for interest is interest paid on past due accounts and money borrowed from the bank, which could be eliminated if our capital were large enough for our business.

The item for incidentals includes car fare and expenses on trips looking out for work, and it also includes repairs to tools, etc., and depreciation on tools and fixtures, which is figured annually at 10 per cent.

The item for freight and drayage is made up of items not directly chargeable to any particular job or contract, as the item freight and drayage is entered into each estimate we make and is charged on the record of cost kept for that work.

The item for non-producing employees is made up of persons whose time cannot be charged to any particular job or contract, such as the teamster and the bookkeeper.

All of the figures given are gleaned from our books, and we endeavor to keep a strict record of all expenses and have done so since we began business.

We trust the figures given will be of value to some of our readers.

THE HOW AND WHEREFORE OF OVERHEAD CHARGES

Educational Literature Distributed Among the Members of the Master Plumbers and Steam and Hot-Water Fitters' Association

Overhead charges (expense of doing business) must be considered as a certain percentage of our *gross sales* (the total amount at which our labor and materials are billed to our customers). Now while our *gross sales* may vary from year to year, it is possible that our *overhead charges* may remain pretty much the same, so that one year our *gross sales* may amount to $200,000 and our *overhead charges,* $20,000 (10 per cent. of our gross sales), and another year we may not be so fortunate, and our *gross sales* may not amount to more than $100,000, while our *overhead charges* still amount to $20,000, which would be equal to 20 per cent. of our *gross sales.*

Those of us who have been in business long enough have averaged these conditions, and each year we assume that our *gross sales* are likely to amount to not less than a certain sum, and knowing what our *overhead charges* amount to, we are able at once to estimate the *selling price* of every dollar's worth of material and labor which we have to offer to our prospective customers.

AN ILLUSTRATION

Now for the sake of making the arithmetic of this process perfectly clear to all, we shall assume an example as follows:

An article (material or labor) costs us an even $10, our *overhead charges* amount to 20 per cent. of our *gross sales* and we desire to make a *profit* of 20 per cent. The question is at what price should we sell this article to insure this *profit* and cover this *overhead charge?*

SOLUTION

		Per Cent.
The selling price		100
Expense	20	
Profit	20	
	—	40
		60

Which means that $10 equals *cost,* which equals 60 per cent. of the *selling price.*

Ten dollars ($10) divided by 60 equals 0.01666 of 1 per cent., and that multiplied by 100 per cent. equals $16.66, the *selling price,* i.e., price at which an article costing $10 must be sold in order to provide for *overhead charges* equal to 20 per cent. and show a profit of 20 per cent.

PROOF

The proof of this method may be shown as follows:

Selling price equals 100 per cent		$16.66
Cost of article	$10.00	
20 per cent. of selling price, $16.66, equals *overhead charges*	3.33	
20 per cent. of selling price, $16.66, equals PROFIT	3.33	
		$16.66

ERROR SHOWN

We find that some of our members have been figuring their *selling price* as follows:

Cost of article	$10.00
Overhead charges	20 per cent.
Profit	20 per cent.
	40 per cent.

Forty per cent. (40 per cent.) equals $4, which added to the *cost,* $10, equals $14, their *selling price,* from which one may see that such process is *absolutely wrong,* as it would result in a bare profit of only 67 cents, whereas the original intent of the seller was to secure a *profit* of $3.33.

THEREFORE

Having pointed out the *how* and the *wherefore,* it is up to each of us to apply same to our own particular business; *not to do so, is to fool no one but ourselves.*

If any of our members have any question they would like to have answered, we invite them not to hesitate, but to submit same to our secretary, and same will receive prompt attention.

NOTE THESE RULES

If your *overhead charges* amount to 10 per cent. and you desire a *profit* of 10 per cent., divide the *cost* of the article by 80 and multiply by 100, to find *selling price.*

If your *overhead charges* amount to 10 per cent. and you desire a *profit* of 15 per cent., divide the *cost* of the article by 75 and multiply by 100, to find *selling price.*

If your *overhead charges* amount to 15 per cent. and *profit* 15 per cent., divide *cost* of the article by 70 and multiply by 100, to find *selling price.*

If your *overhead charges* amount to 15 per cent. and *profit* 20 per cent., divide *cost* of the article by 65 and multiply by 100, to find *selling price.*

COMPETITION AND OVERHEAD CHARGES

Experience of a Heating Contractor Who Has Built Up a Successful Business in a Small Town

The matter of Overhead Expense, to which *Metal Worker, Plumber and Steam Fitter,* and other trade papers have devoted so much space during the past year, is indeed a very vital question. But the great question, to the heating man, at least, is not the matter of "Proportioning Overhead Charges to Service," but how to get it out of his customers at all. Ordinarily we only have to whisper to a man who has cheated himself to make him hear, and the fact that all this hullabaloo is necessary to induce us to add another ten or fifteen per cent. to our customers' bills is proof that there is some great restraining cause which prevents us from reaching for that money which we need so much.

I view this question from the steam fitter's standpoint. I am hedged in by none of the legal restrictions which discourage amateur plumbers, but for many years have been doing a steam-fitting business in a city of less than 15,000 inhabitants.

It is not a growing place, not having increased materially in population in the last twenty years. Neither is it a business center for any considerable surrounding country. It is safe to say that four pairs of men working steadily could have done all the steam and hot water heating work that has been done here in any one year, and yet there lies before me a list containing the names of fifty-five firms and individuals who have been engaged in this business, with this city as their headquarters, during the past twenty years. Most of them had the same idea about the profits of the business that W. B. W. admits that he used to have in the article on Overhead

Expense in the issue of June 6, when he figured that the boss was sitting still and making $27 a day.

With this amount of business training and the mechanical ability to cut off and thread a piece of pipe, and a boiler salesman who will help them drum up trade, make working plans and pull them out of the mire when they get stuck, the newcomers are ready for any amount of business.

Overhead Expense is to them some sort of an abstract entity like the ‘‘fourth dimension,’’ and nothing to be considered in figuring costs. Add to this the fact that inexperience is likely to under, rather than over-estimate the time necessary to do work, or perhaps lead to forgetting some essential feature, and one need not wonder that so many competitive bids represent an absolute loss to the successful bidder.

With competition like this ever with us, what are we to do? Conditions are not improved when one of these mushroom competitors drops out, for another immediately steps in to take his place. It is a fact that many people who would never think of getting their dentistry done by a horse doctor, even if he would do it cheaper, will get their heating done by a man whose entire experience has been gained while firing a locomotive, because his figures are perhaps $25 lower than those of a heating specialist. Shall we then enter the race to see who will be first closed out by the sheriff, by figuring to get the work, or save ourselves by tucking all the overhead charges on to the customer who asks for no competitive figures?

In my own practice I find that for various reasons which are mostly personal my overhead charges are very small—not over 10 per cent. of the gross yearly business, in estimating the cost of work I figure as nearly as possible the cost of all the material which will go into it, freight, cartage, car fares and board of men, if any, and labor. I add these items together and find 25 per cent. of the total. This 25 per cent. represents the sum of the overhead expense and the profit anticipated, and added to the original sum gives the contract price.

Suppose the estimated cost of the stock, labor, etc., is $400; 25 per cent. of this would be $100, bringing the contract price to $500, and the allowance for overhead expense and profit would each be $50.

ESTIMATING FROM ARCHITECT'S PLANS

Method of Making Up Plumbing Estimates, Eliminating Guesswork in Computing Cost of Labor and Quantities of Materials

By Wm. Hutton

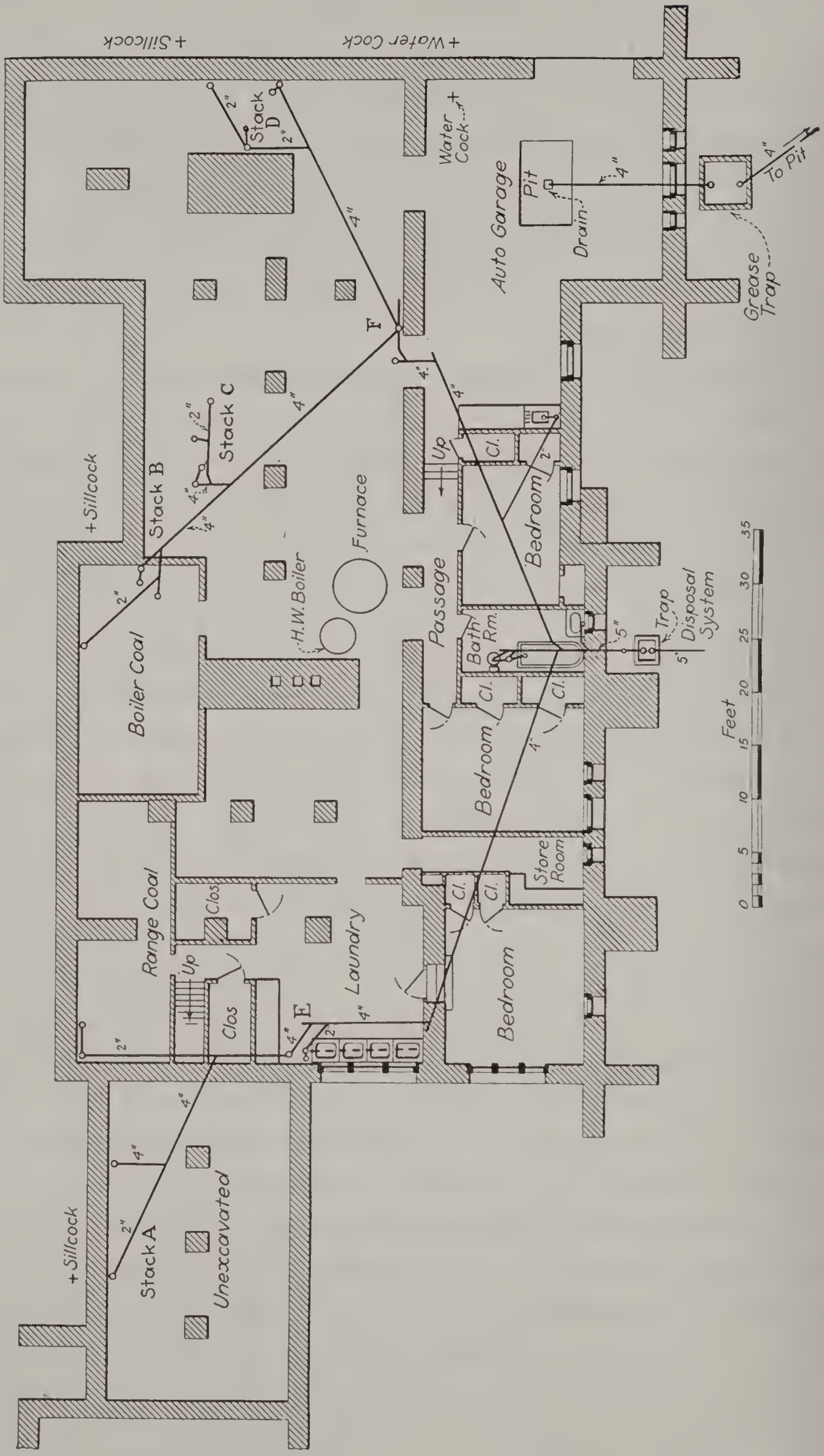
Presumably every plumber who starts to make an estimate of the cost of installing work from an architect's plan follows some kind of method in arriving at the amount of material required to complete the work. The only thing then that can be questioned is whether his method is the best one to use and whether he gets down to the closest possible approximation of the labor, cost and quantity. I do not profess to show other men anything new in this department of business, but it may be of interest, and I hope of some value to them if I were to tell how I had measured plans for a number of years and have been able to come within a very close range of the exact cost in practically every instance. Then other methods can be compared, and if a better one than mine is shown I shall of course, recommend that contractors use the best one.

I know that it requires quite a little preliminary work to use the system I have, and that time is occasionally limited. But when a plan has been given me for the purpose of measuring and I have been asked to give an estimate within an hour or so, I have simply refused to give other than an approximate price. If the work had already been laid out by the architect or engineer, I, of course, would measure it and price it in a very short time, but if, as is too common practice, only the position of the fixtures was given, I have asked for time to follow the procedure I am about to outline, and I generally am granted it. So far as the cost of doing this is concerned I would much rather spend a few hours in arriving at an accurate idea of the work to be done and the material that will be wanted, than stand the risk of dropping a few hundred dollars by overlooking some part of the work.

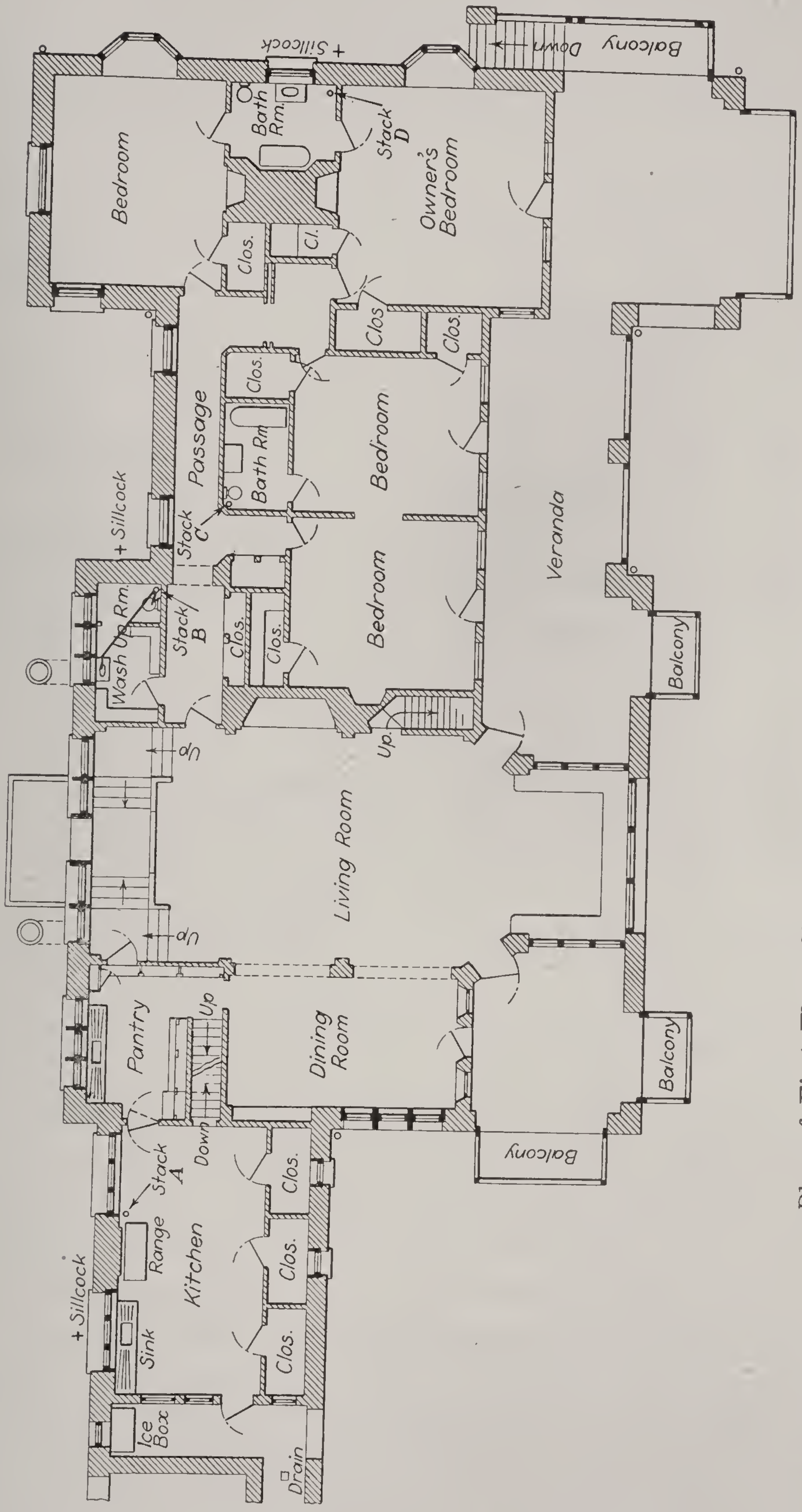
I have selected for an example a job which was done two years ago and which came out almost exactly as I figured it would. There were a few differences in the number of fittings and amounts of the different kinds of pipe, but the cost averaged up practically right, and the differences were due to constructional changes made at the owner's request.

The first thing to do when a plan like this comes in is to find out all about the local conditions. The architect's specifications will often make this clear, and in this case parts of the basement were to be finished and a considerable part of the sewer lines had of necessity to be run under these floors. It was necessary to have some idea as to the nature of the ground, and this was stated in the specifications to be rocky; therefore, due allowances were made for time lost in getting around difficulties that might crop up in laying the pipes. This fact was noted on a blank pad. The plan showed that the part under the kitchen was not to be excavated, and inquiry showed that access could be had to run the soil pipe and supply lines so that no allowance had to be made for extra labor. The points E and F were then noted in the basement plan as suitable for rising up to carry the soil pipe on the ceiling from there. Then the lines which were to receive branches from the basement fixtures were pencilled on the blue print and the position of cleanouts marked.

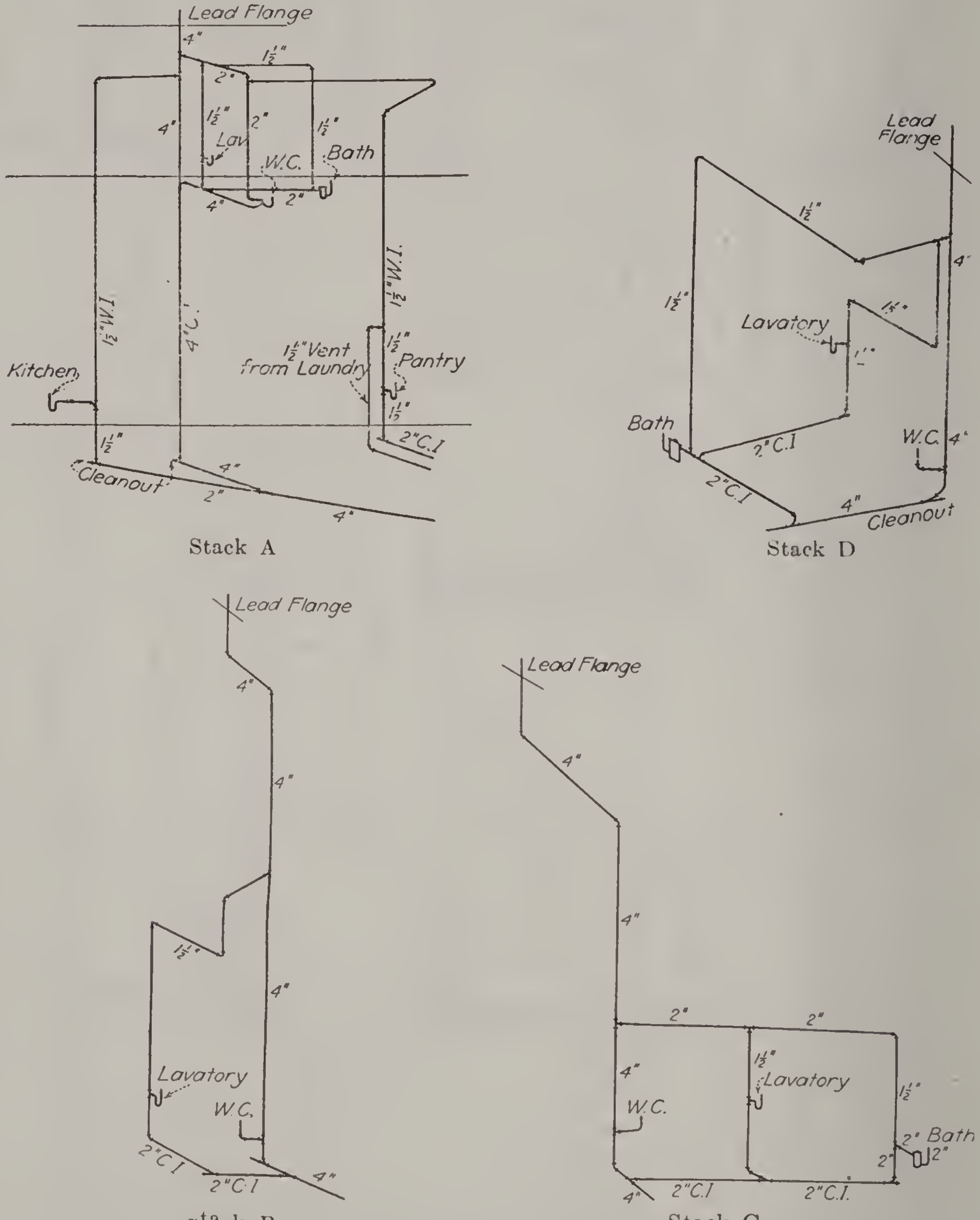
A study of the first floor plan shows that the most convenient location for the rising 4-inch line was in each case as close to the closet as possible, and accordingly these were marked in. In this connection it should be stated that the position of the fixtures was changed in the bath room served by stack D, and the lavatory was set where the closet is shown, while the closet was moved over to the corner in which the soil pipe rises, thus leaving the window more accessible. The best line to reach



Basement Plan, Showing Drainage Lines and Location of Soil Pipe and Vent Stacks A, B, C, D, E and F



Plan of First Floor, Showing Location of Fixtures, Soil and Vent Stacks the various fixtures was then laid out and penciled in, as shown on the plan. The line serving bath room C and the toilet room was held over to enable it to clear the warm-air pipe and to avoid the stone column supporting the floor timbers, and enters the risers with a Y and an eighth bend. It was then necessary to study the roof plan, and it will be seen that the roof is considerably broken up at the rear of the building, and that the windows lighting



Stack A

Stack D

Stack B

Stack C

Riser Diagrams to Facilitate Taking Off Materials Accurately the bath room served by stack B and the corridor were to be considered when deciding where to bring the stacks through the roof. It was seen that stacks B and C would have to be offset and carried up inside the roof line to get above these windows, and this was also noted on the plans. Then the best method of venting the trap was looked into, and it was seen that continuous vents were possible on almost all of the fixtures. Therefore, the elevations of the stacks were made on separate sheets of paper.

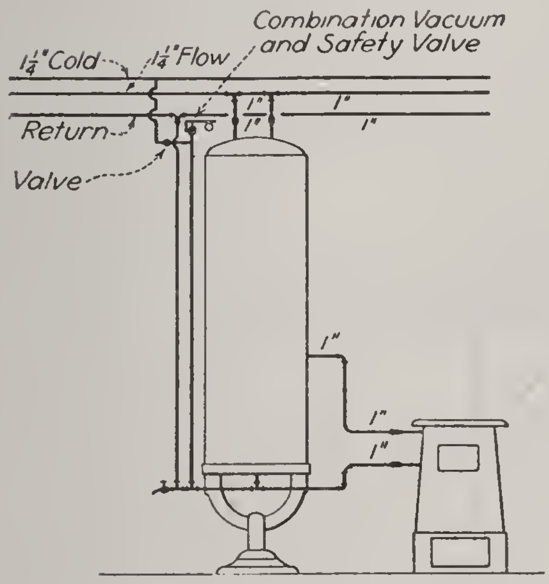


Diagram of Range Boiler Connections

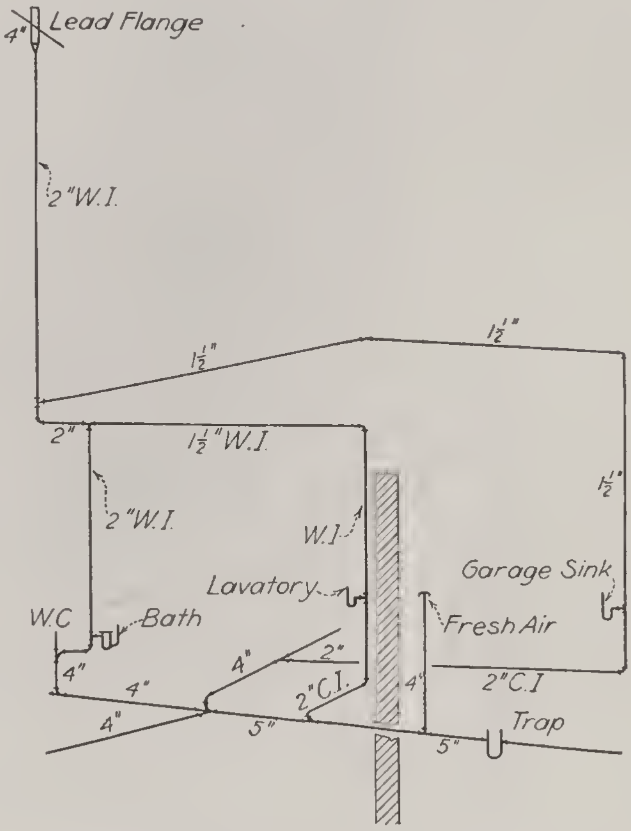
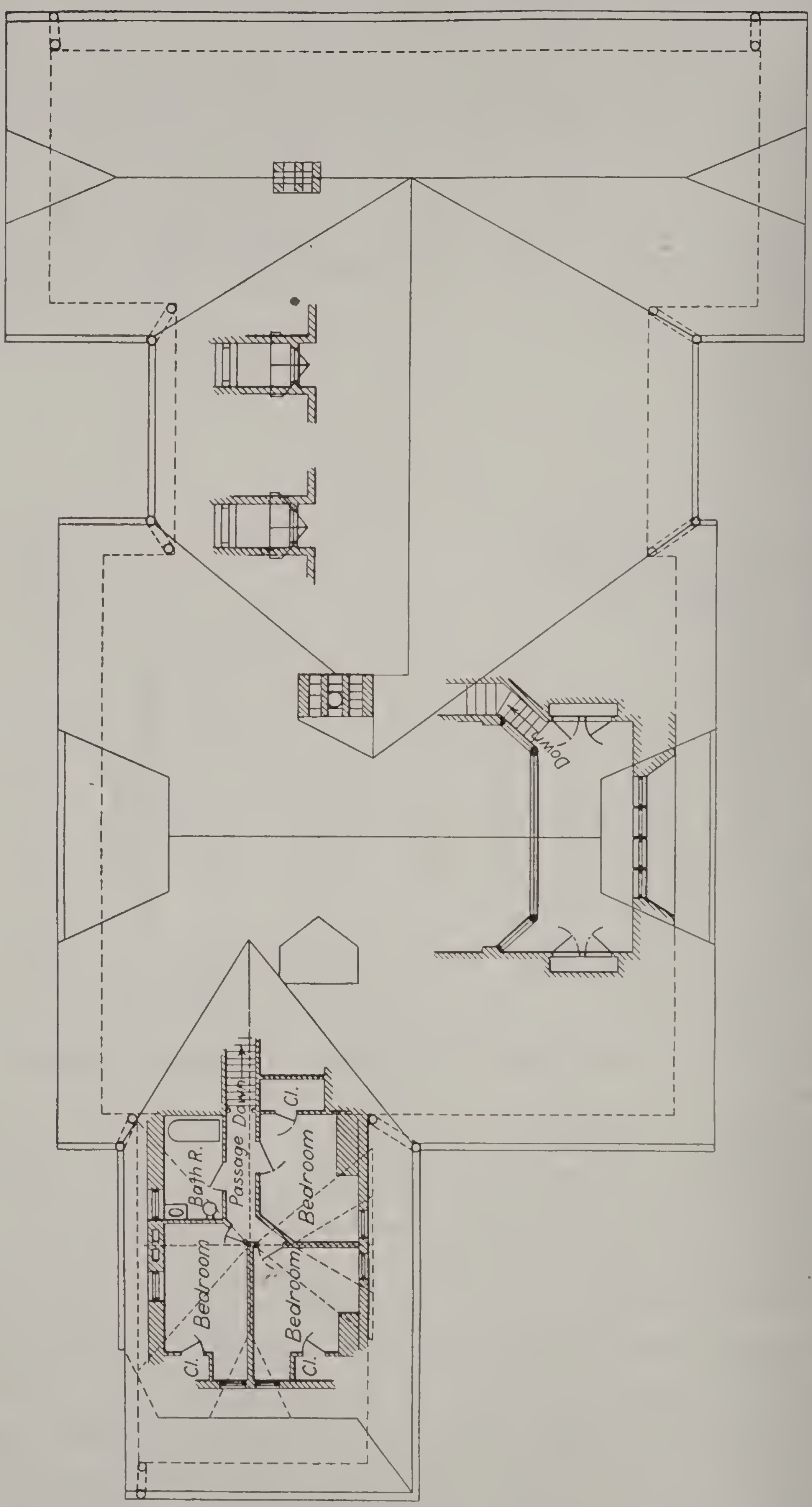


Diagram of Basement Soil and Vent Lines

The 4-inch riser for the servants' bath room on stack A has a clear way direct to the roof, and it was a simple matter to raise an elevation for this and carry the 4-inch connection for the closet between the joists of the second floor and providing a T Y for each lavatory and bath. The pantry sink, being in close proximity, the simplest means of venting this was by a continuous line carried up to and connecting with those venting the upper bath rooms and also making a connection from the laundry in the basement. Then the kitchen sink was considered and



Roof and Attic Plan, Showing Location of Servants' Bathroom Fixtures a path found for the vent from this also to connect to this line. Thus all the fixtures at this end of the building were taken care of.

Then the toilet room stack was looked into and here the necessity of keeping away from the window was kept in mind by the note on the plans. It was a simple matter to plan this showing an offset up to a point which was clearly above the window and also to find a road for the vent from the lavatory between the floor joists on the second floor and then connect with the 4-inch stack. No vent was considered necessary for the closet as the bend was connected directly into a sanitary T and therefore amply protected by the 4-inch line.

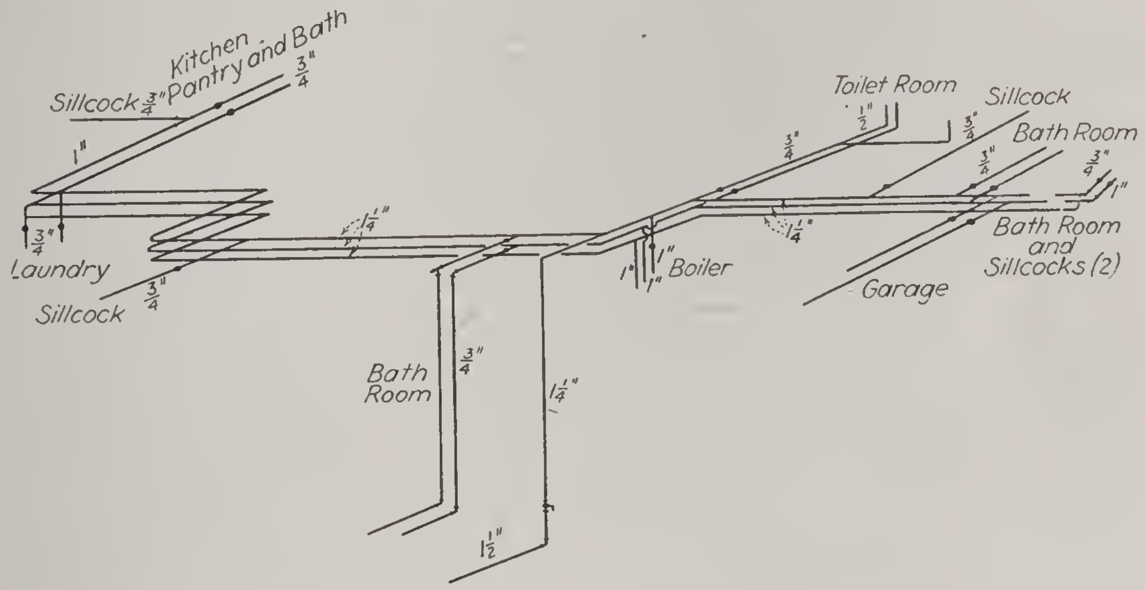
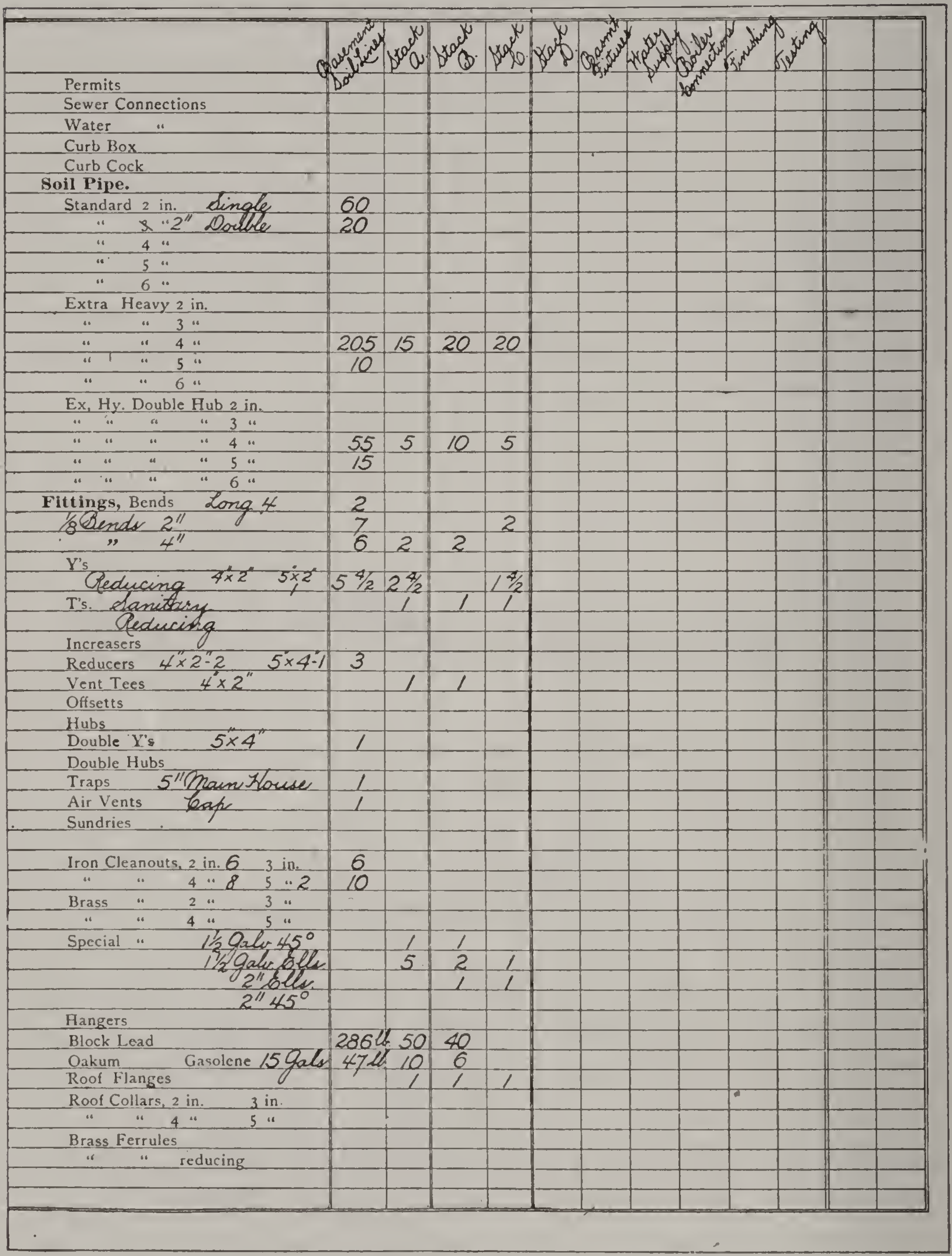


Diagram of Hot and Cold Water Connections

Stack C also had to be offset to clear the window, and this was shown on the elevation made of this stack and the bath tub and lavatory planned to be vented on the continuous system running back along the partition to the 4-inch sack. No back vent was given to the closet in this case, either, the protection being ample. Stack D was a little more difficult to plan, as the bath room window was low and was liable to interfere with the vent stack and to make a connection to the stack would be difficult if carried above the ceiling, the roof coming down to the ceiling line at this point. It was found, however, that by holding the vent line close up to the sill of the window it would be above the water line of the basin, and therefore it was marked in as shown and connected together with that



	Basement Soil Lines	Stack A.	Stack B.	Stack C.	Stack D.	Basm't Fixtures	Water Supply	Boiler Connections	Finishing	Testing		
Permits												
Sewer Connections												
Water "												
Curb Box												
Curb Cock												
Soil Pipe.												
Standard 2 in. Single	60											
" & "2" Double	20											
" 4 "												
" 5 "												
" 6 "												
Extra Heavy 2 in.												
" " 3 "												
" " 4 "	205	15	20	20								
" " 5 "	10											
" " 6 "												
Ex, Hy. Double Hub 2 in.												
" " " " 3 "												
" " " " 4 "	55	5	10	5								
" " " " 5 "	15											
" " " " 6 "												
Fittings, Bends Long 4	2											
1/8 Bends 2"	7			2								
" 4"	6	2	2									
Y's												
Reducing 4"x2" 5"x2" 1	5 4/2	2 4/2		1 4/2								
T's. Sanitary		1	1	1								
Reducing												
Increasers												
Reducers 4"x2"-2 5"x4"-1	3											
Vent Tees 4"x2"		1	1									
Offsetts												
Hubs												
Double Y's 5"x4"	1											
Double Hubs												
Traps 5" Main House	1											
Air Vents Cap	1											
Sundries												
Iron Cleanouts, 2 in. 6 3 in.	6											
" " 4 " 8 5 " 2	10											
Brass " 2 " 3 "												
" " 4 " 5 "												
Special " 1½ Galv 45°		1	1									
1½ Galv Ells		5	2	1								
2" Ells			1	1								
2" 45°												
Hangers												
Block Lead	286 lb.	50	40									
Oakum Gasolene 15 Gals	47 lb.	10	6									
Roof Flanges		1	1	1								
Roof Collars, 2 in. 3 in.												
" " 4 " 5 "												
Brass Ferrules												
" " reducing												

Page of Estimate Book, with Materials Required Filled In

from the bath trap, just above the level of the door lintel to the 4-inch stack and the lead bend was left unvented.

This left the bath room and garage fixture in the basement to be planned, and as it was somewhat hard to carry vent stacks directly up from these, owing to the large veranda which is shown over the ceiling of this part of the building, the lines were carried back to the inside wall of the second floor and the vent from the sink connecting at the ceiling level of the basement with 2-inch malleable iron pipe, was carried up and increased as it went through the roof.

The closet in the basement was vented by the bath connection. This is not always considered good practice, but with the connections as shown it was considered that the trap would be perfectly safe from loss of seal in any condition, and this has been proved correct.

The water supply system was then laid out and a sketch of this prepared showing the general location of the various branches. It was then an easy matter to measure up all of the material and to get the number of fittings required on vent, soil and supply lines, while the labor could be computed in the same manner; that is, by sections, and a close estimate obtained. Taking the main house trap as the starting point, the sewer connections being along with the water supply taken care of in a separate estimate, and following the line into the house, the fittings were taken off as they were reached.

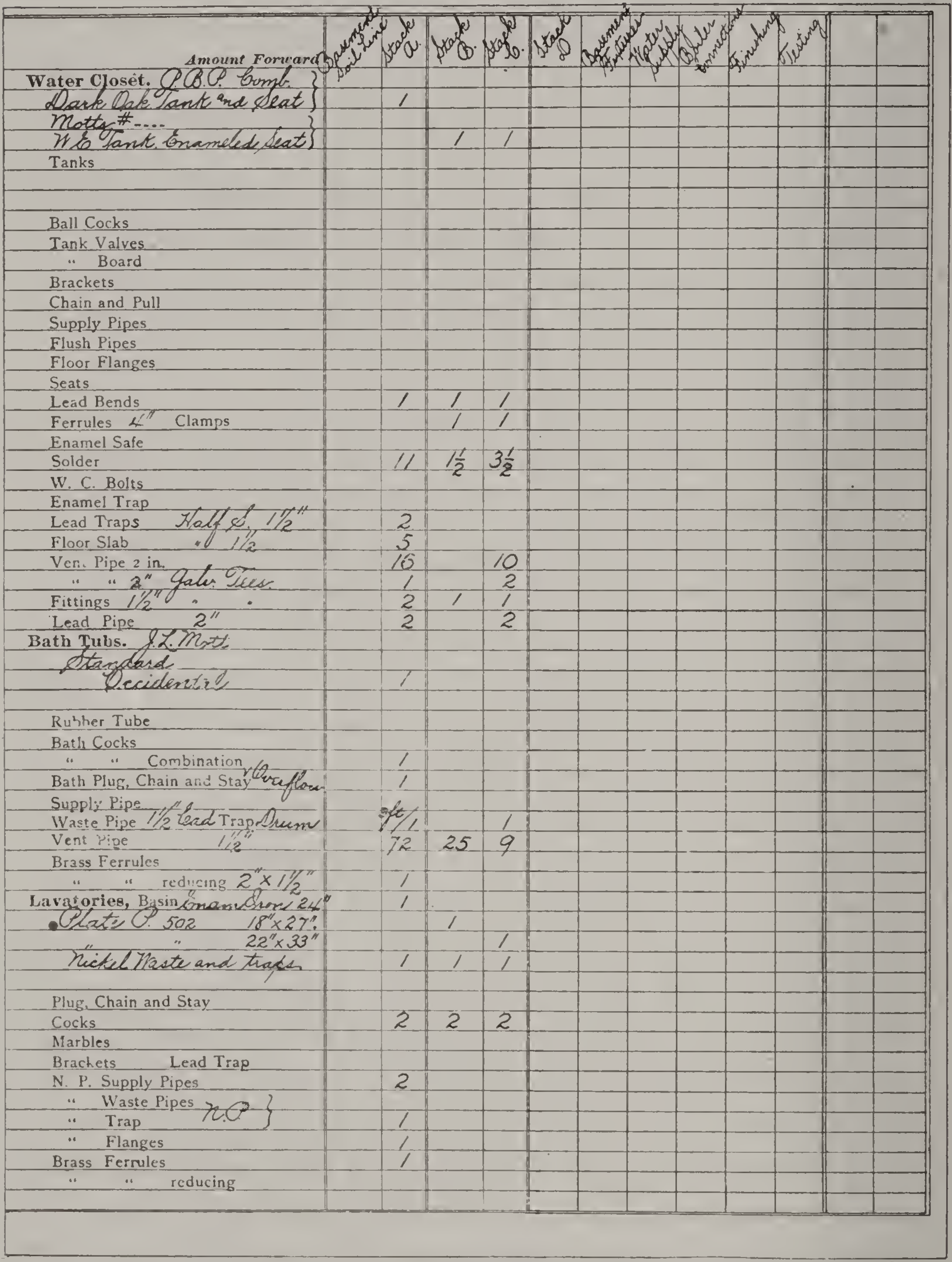
Thus the first list would read like this:

One 5-inch main house trap, two 5-inch cleanouts, one 5 x 4-inch tee, one 4-inch vent cap, and so on.

At the double Y the line to the left is followed when a Y with a cleanout is taken where it changes direction, and so on to point E, where the line rises to a point about 9 inches below the first floor joists, and thus continues along the wall with branches to the kitchen and bath room. The fittings right up to the riser were taken and then the total length of pipe measured and the number of joints estimated so that the amount of lead required could be calculated. This was taken on a basis of 3 lb. for a 4-in. joint, 3¾ lb. for a 5-in. joint and 1½ lb. for a 2-in. joint.

Oakum was allowed at an average of about 2 lb. for five joints.

Then returning to the double Y, the short piece serving



Amount Forward	Basement Soil Line	Stack A.	Stack B.	Stack C.	Stack D	Basement Fixtures	Water Supply	Boiler connections	Finishing	Testing		
Water Closet. P.B.P. Comb. }												
Dark Oak Tank and Seat }		1										
Motts #.... }												
W. E. Tank. Enameled Seat }			1	1								
Tanks												
Ball Cocks												
Tank Valves												
" Board												
Brackets												
Chain and Pull												
Supply Pipes												
Flush Pipes												
Floor Flanges												
Seats												
Lead Bends		1	1	1								
Ferrules 4" Clamps			1	1								
Enamel Safe												
Solder		11	1½	3½								
W. C. Bolts												
Enamel Trap												
Lead Traps Half S. 1½"		2										
Floor Slab " 1½		5										
Vent Pipe 2 in.		16		10								
" " 2" Gate Tees.		1		2								
Fittings 1½" " "		2	1	1								
Lead Pipe 2"		2		2								
Bath Tubs. J. L. Mott												
Standard												
Occidental		1										
Rubber Tube												
Bath Cocks												
" " Combination		1										
Bath Plug, Chain and Stay Overflow		1										
Supply Pipe												
Waste Pipe 1½" Lead Trap Drum		3ft/1		1								
Vent Pipe 1½"		72	25	9								
Brass Ferrules												
" " reducing 2"×1½"		1										
Lavatories, Basin Enam Iron 24"		1										
Plate P. 502 18"×27"			1									
" " 22"×33"				1								
Nickel Waste and traps		1	1	1								
Plug, Chain and Stay												
Cocks		2	2	2								
Marbles												
Brackets Lead Trap												
N. P. Supply Pipes		2										
" Waste Pipes N.P. }												
" Trap		1										
" Flanges		1										
Brass Ferrules		1										
" " reducing												

Page of Estimate Book, with Materials Required Filled In

the basement bath room was taken and the line followed to point F, where it rises and is carried overhead. The procedure was followed out to the base of each stack, as before, and every fitting taken as it was reached, then the total length of pipes measured and joints counted so that lead and oakum could be estimated. Allowance for hangers had also to be made and some idea of the amount of cutting necessary formed so that a proper allowance could be made for waste and for the provision of double hubs lengths in the order for material when this came along. This sheet was temporarily pinned on the basement plan and the elevation sketches taken up in rotation.

Commencing with stack A the 4-in. line was followed up to the roof and we got a list beginning like this: One 4-in. sanitary T, two 4 x 2 in. vent T's, one lead roof flange, and then coming back to the bath room branch we got:

Two 4 x 2-in. sanitary T's, two 4-in. eighth bends, one 4-in. lead bend, one 4-in. brass ferrule, two feet of 2-in. lead pipe, one 2-in. solder nipple, three pounds of solder. This list was continued to cover all of the vent stacks from the connection at the base of the riser, including the drainage T's and ells at the pantry sink and lavatory, and also the lead trap and wiped connections to where the vent pipes connect with the 4-in. pipe.

Stacks B, C and D were figured in the same manner and then the connections for the waste and vent pipes at the laundry were measured up and the bath room wastes and vents with the connection of the garage sink and its vent pipe right to the roof were taken. Each of these was taken off on a separate sheet and pinned to the sketch of its particular stack. This procedure was followed out with the water supply system plan, and the small pipes required to continue the branches to the fixture in the room it was to supply, and the elbows, tees and other fittings were counted.

The hangers for the pipes in the basement were also allowed for at the distances required and also valves for each branch as called for by the specifications. The boiler and heater were then considered and the sketch of the probable connections made and the quantities taken off in the same manner.

It may be noted that those shown on the sketch given are of a somewhat unusual nature. These were made because of a desire to use a standard tapped boiler and to favor the rapid circulation in the horizontal pipes as much as possible. A vacuum valve protected the boiler from siphonage should the supply from the main fall below the level of the boiler.

It is a good plan to figure the labor on the roughing-in work entirely separate from that on the finishing, and this is best done at this point. Taking each section as it has come along and, of course, allowing for all local conditions such as distance from the shop, delays that might occur in delivery of stock and other incidentals, the time is taken on the basis of the time one plumber and helper would require to install the work. In this case it would be taken in this way:

Preliminary work, shipping and getting material to job, 1½ days; all soil pipe work in basement, 5 days; lead work in basement, 2 days; stack A, soil pipe riser and roof connections, 1 day; lead work and branches to bath room, 1 day; all venting and wrought-iron pipe work, 1 day; stack B, 4-in. riser and roof connection, 1 day; lead and wrought-iron pipe, 1 day; stack C, 4-in. soil pipe and roof connections, 1 day; lead work and venting, 1 day.

This process was followed right through the whole job until every section of it had been taken and the setting of the fixtures and all testing and finishing work were estimated separately to get the allowance down to somewhat near the actual time required. The total time allowed came to 36 days of one plumber and his helper, and although the job was handled by several men the total amount of time required to complete the work came out almost exactly right.

For the purpose of preserving a record of the estimates each of the slips and the sketch plans was filed on a loose-leaf file, and the total amounts carried forward to a proper contract and estimate book in the manner shown in the accompanying illustration. The prices were then carried forward to the proper columns making all allowances for overhead expenses and for every possible charge on the job which had not already been allowed for in the estimate for time and material.

In arriving at the correct amount of "overhead expense" it does not seem right to me to charge everything that does not come within the classification of material or labor to this account. All freight charges and cost of hauling to the job should be added to the cost of the material in arriving at the net price on which the selling price is based. If this is not done certain articles are charged with an undue share of this expense. Included in the overhead charges, however, would naturally be insurances, breakages, wear and tear, rent, taxes and telephone calls, and such items as cannot rightly be charged in detail to any customer's account as they are incurred.

If the estimate is accepted and the contract signed up, the sheets that have been made in preparing the estimate are found extremely convenient in ordering the material, as they present a list of what is required and save ordering an excessive amount of material which may not be used and returned to stock. The disadvantage of piling up stock which comes back from several contracts and which may not be required for a considerable period again, is apparent, and the nearer to the exact amount that the order can be kept down while providing a fair allowance for breakage and for slight changes in construction, the more profit will be left to the contractor.

DIAGRAMS FOR ESTIMATING PURPOSES

Outline of a Simple System for Protecting the Plumber in Estimating

By W. B. G.

Of all tradesmen the plumber probably takes the least precaution against possible mishaps, errors in estimating included, that may involve expense through omissions, changes in the house, or fixtures, or location of fixtures. Architects, owners, builders, manufacturers and jobbers all see, in their own interest, that the plumber's contract leaves nothing unsaid and his work nothing undone that may cause them expense, while the average plumber objects to nothing, agrees to everything, takes every chance and wades in, often without so much as a detailed estimate of the goods he presumes will be required to do the job. Frequently he depends upon an unsigned memorandum, without date, as a basis of cost of the goods, in lieu of a regularly rendered quotation specifying the goods and stating the latest date they will be supplied at the prices quoted.

I have endeavored at all times to have my employees live up to a limited system. From the few omissions that have occurred, enough trouble and expense have resulted to make me certain that a reasonable amount of precaution in the shape of diagrams, quotations and memoranda is quite necessary, even though conscientious observance of the details of the most meager system that will be effective is irksome. Anyone keeping up the veriest make-shift of a system will butt in to something that will prove a little system is worth its cost.

The writer depends upon a simple plan, the principles of which are illustrated by the accompanying sketches. All the fixtures in the house are shown in Fig. 1, imposed in true plan position. It is the first step toward making an estimate. Tracing paper is laid over the basement blueprint and any fixtures thereon marked by tracing around the architect's images with a pencil having a hard point, and carbon paper under the blueprint to secure another tracing on white paper underneath it. The principal corners on the plan are marked, the paper is then placed in position over the first floor plan, so that the corners match and the fixtures on this plan are outlined

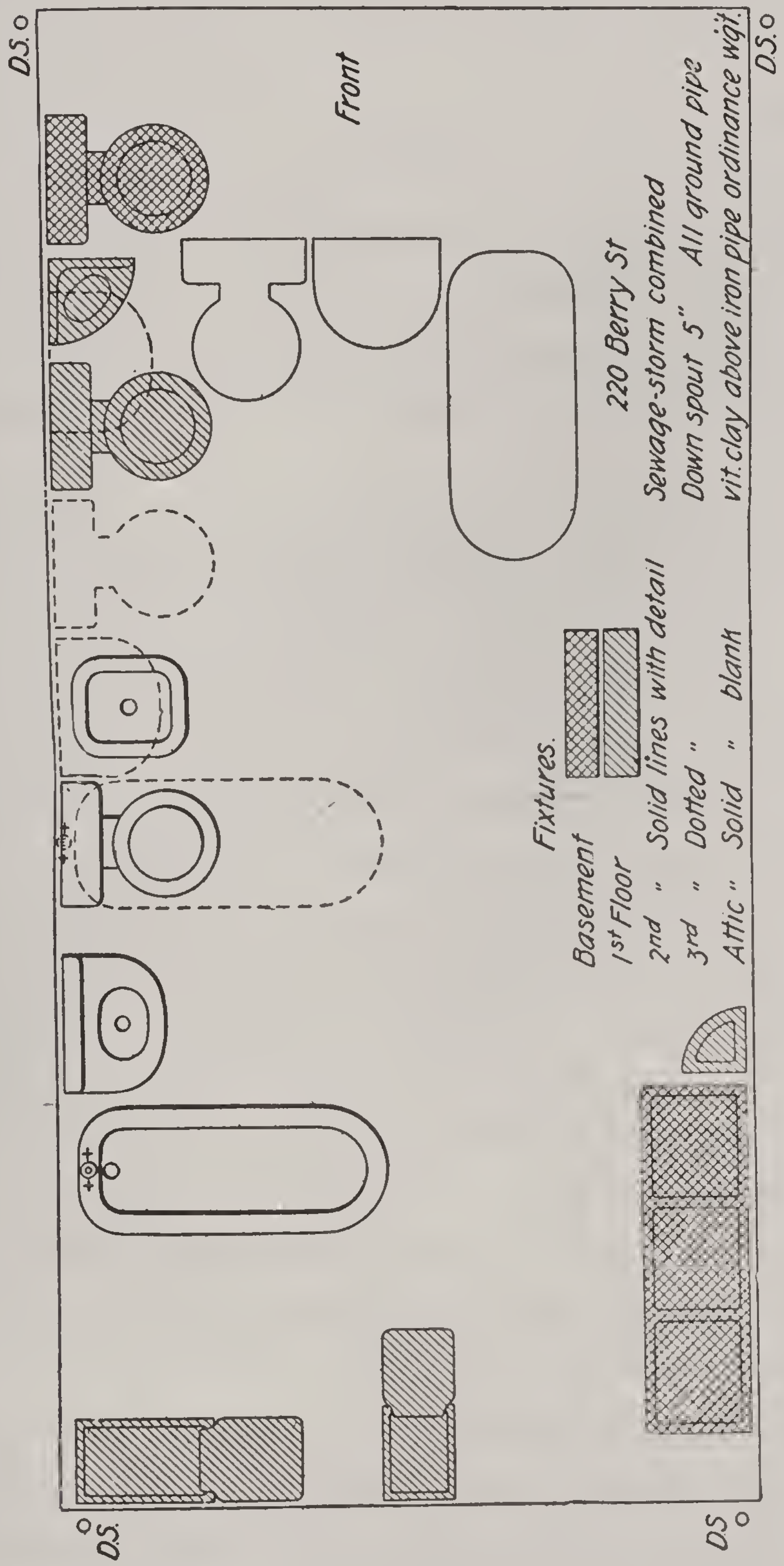


Fig. 1—Composite Plan, Showing Location of Fixtures on All Floors

with the pencil as before, and so on for each floor that has fixtures.

In order to distinguish the fixtures of one floor from another in the composite plan, there must be some difference in the treatment of the images. For one or two floors the simplest way is to place a ''B'' on basement fixtures; ''1st'' on first floor; ''2d'' on second floor fixtures, etc. Another means is indicated by the schedule in Fig. 1. This can be used regardless, or when there is but one color of carbon paper at hand. Different colors of carbon paper are frequently used for the different floors by the writer, and he has made diagrams with one color of carbon and marked the forms with colored pencils or ink afterward.

In Fig. 1 the basement fixtures are openly section-lined both ways. The first floor fixtures are section-lined one way. The second floor fixtures are diagrammed by solid lines and some detail. For instance, the lavatory bowl, back and waste, the closet flush rim and outlet, and the rim of tub are indicated by an inside and outside line. For the third floor the outlines of the fixtures are dotted in, with the same detail as shown for the second floor, while the fourth floor, the attic in this case, fixtures are indicated by solid outlines, all details omitted. It will be noticed that the supply fittings of one bath are shown as going through the rim, another as standing behind the rim and a third indicates a double combination faucet in the bath. It is usual to make such indications, if the person is familiar with the trimmings, whether they are indicated on the house plan or not.

The advantages of Fig. 1 are not confined to aiding in interpreting the soil pipe diagram shown in Fig. 2. The original copy on file is approximately to scale, being drawn over the architect's fixture indications. As shown in Fig. 1, it has been broken up so as to occupy as little space as possible. It is conclusive evidence of the number and kind of fixtures each floor contains and where they are located, according to the plans by which the bid was made. If any change in the house walls, partitions, fixtures or location of fixtures is subsequently made by the architect, owner or builder, before or after the house has been commenced, this diagram stands as evidence of what was bid on. If any dispute arises, the plumber being able to show that it is his invariable habit to proceed along the lines evidenced by his diagrams of the work in question, there is scarcely a shadow of a doubt as to whether he is entitled to extra compensation for a change.

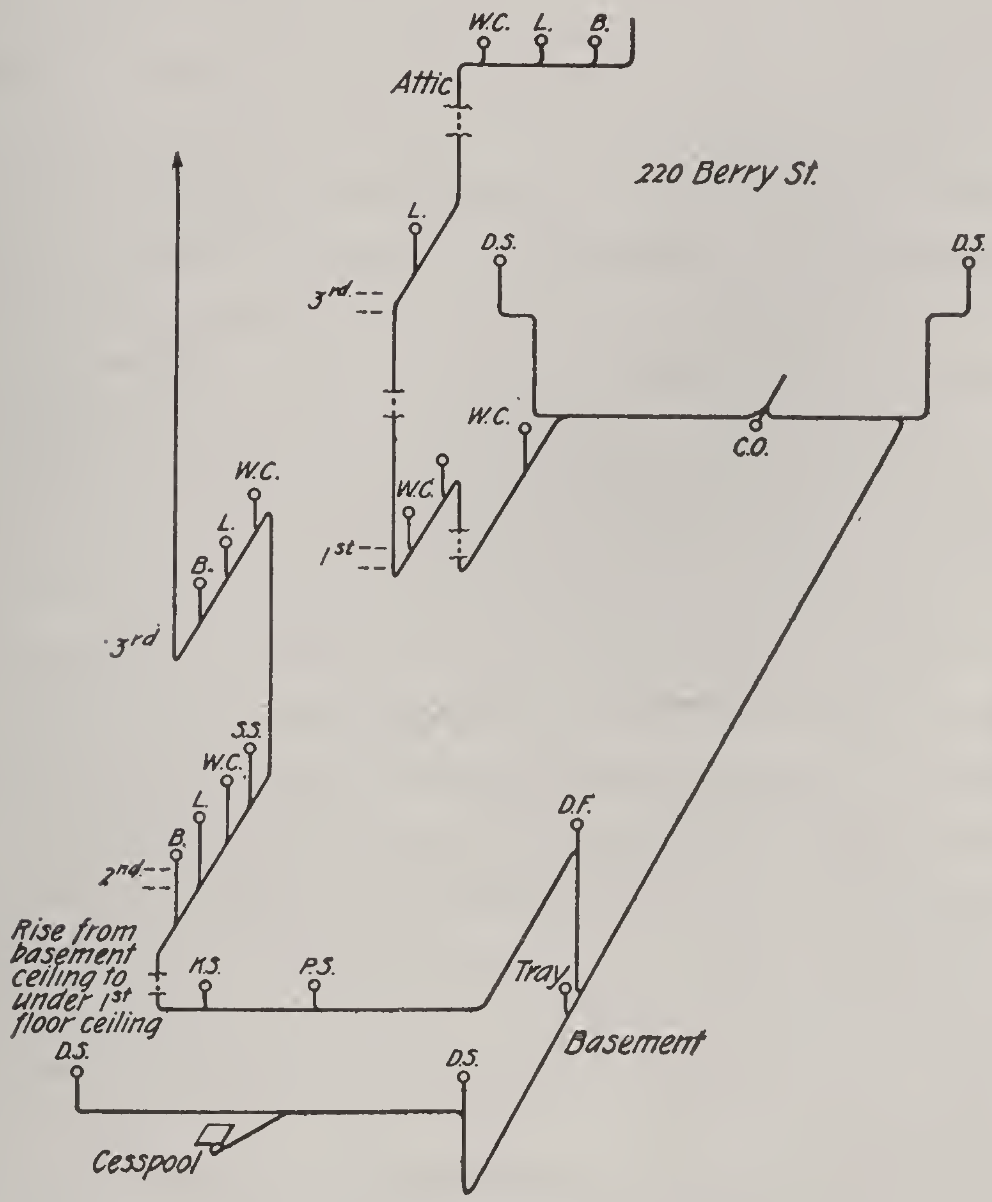


Fig. 2—Skeleton Diagram of Pipe Systems

To cite an instance of the value of having this positive information on hand: A house proved to be altogether different from the original plan on the second floor when the time came to install the work. The journeyman reported that neither of the diagrams agreed with the house and asked for instructions. The plumber was flatly disputed by the owner, architect and builder in the beginning, but upon exhibiting his estimate diagrams the architect recognized them as having been made from a print of a second floor layout that was quite different from that of the house being built.

Further investigation revealed that quite a little changing had been made in the architect's office before the disposition of the rooms suited the owner. The plans had at one time gone so far as to have blue-prints made from the tracings before the owner objected. In making up the sets of blueprints that were to go out to the bidders a print made from a tracing of the discarded second floor was by error made up in the set handed the plumber for estimating purposes. This fact being established by inference, all hands were ready to admit the plumber was right in his contention and that he should have extra pay for the additional expense he would be under by the other plan. The only diagram made at the time of estimating ordinary jobs is Fig. 1, as the fixtures are all in plan position to a scale, the length of pipe and fittings of a small job can be summed up accurately enough. If the job is secured the figure number of each fixture is marked by it and the carbon lines produced by the pencil are roughly filled in, free-hand, with India ink, together with any other information that may be valuable to journeymen on the job.

If the job is a considerable one, even such as shown, it pays to go further. A sort of skeleton isometrical perspective of the soil pipe system, like that shown in Fig. 2, is produced. This kind of diagram is more quickly made than told about, as it is not made to a scale nor drawn over other plans. In it all vertical pipe is represented by vertical lines, while the balance take something like a perspective position. With the exception of the drinking fountain on the first floor, which might be mistaken for a urinal, it is easy for anyone to see that the points marked D. S. are down spouts; C. O., cleanout;

W. C., water closets; L., lavatories; S. S., slop sink; B., baths; K. S., kitchen sink, and P. S., pantry sink. Hence, when estimating, it is not the custom to mark any but ambiguous images or openings.

With a diagram made in this manner the number of feet of pipe, combination ferrules, Y's, ⅛-bends, ¼-bends, and their sizes may be quickly and accurately counted up. It serves as a guide to the journeyman in getting out the material for the job and saves time after he gets to the building, as it makes considerable thinking on the journeyman's part unnecessary, the estimator having already done the thinking and placed the result before him.

For the estimate alone, the skeleton diagram is carried no further than distinct off-hand pencil lining, but if the job is secured the diagram is gone over with ink and the size of pipe and other details worth while are placed on it and blueprints made, so that in addition to any plans of the house at hand, the journeyman in charge of the job is furnished with a blueprint of both Figs. 1 and 2.

The value of this scheme is readily seen by taking as an example any building where the architects say "all closets and range closets waste will be carried in one system to ....; baths, shower baths, lavatories and slop sinks through another ....; and all kitchen and pantry sink wastes through a separate system to ...., and thence into system ...." It is difficult to estimate, with safety, a job of this type with fixtures scattered promiscuously without the employment of some kind of diagrams, and it is just as cheap to diagram the fixtures in one plane and thus determine the number and position of stacks, etc., as it is to go over the work otherwise carefully enough or often enough to feel sure that all material needed has been included in the estimate.

SIMPLIFIED PLAN FOR ESTIMATING PLUMBING

Scheme to Facilitate Making Up Estimates on Plumbing Work with Accuracy—Explanation of Terms Applied to Architects' Drawings

By H. N. Oman

In the issue of *Metal Worker, Plumber and Steam Fitter* of January 5 there was printed a plea from an Ohio plumber for more definite plumbing plans, made up with more accuracy and arranged so that the plumber will not have to become practically a sanitary engineer (and draughtsman as well) in order to lay out every job on which he bids. It is quite evident that the Ohio plumber has run into trouble on many jobs, and that he is bright enough to see something, which a great many other plumbers seem to have not yet recognized, this being that the trouble is caused by loose and inaccurate plans, or else the lack of detail on them, which gives the architect an opportunity to interpret and demand things which are not indicated and with which the plumber cannot well become acquainted without making a complete plumbing layout on his own account.

This is in no way a part of the plumber's work any more than it would be to present a mason contractor with the plans of a building from the first floor up, and say "Bid on the foundations for this building; we don't know the size, depth or location, but bid anyway." How many mason contractors would take such a job, unless they called in a competent construction or civil engineer to design a proper foundation?

It is a well-known fact that a large part of non-productive expense of every plumbing business of any size or importance is the time and money spent in making careful and accurate estimates on work which is never received, simply because some other foolish or inaccurate plumber has slipped up a little on his figures somewhere and put in a figure less than the *cost plus a reasonable profit,* thus landing the job, but receiving probably very little financial benefit at the end on account of his costly error.

It is the object of this article to present to both the plumber and the architect the advantages to all concerned, including *most emphatically* the *owner* who pays the bill, of having complete and accurate plumbing plans and definite specifications which do not permit a substitution by an unscrupulous bidder, of materials or fixtures of a grade inferior to what the honest bidder would feel called upon to install. It may also be well here to add that the writer does not hold the architects to blame for the present laxity along these lines. Many of the architects doing a better class of large work are employing a sanitary engineer to lay out and even inspect the installation of all the larger plumbing jobs and it is believed that this is going to become more general in the near future. The chief blame lies, however, with the plumber, and with him alone.

Of course no plumber would refuse to bid on a good set of accurate plans, but how many refuse, or can afford to refuse, to bid on the architectural prints alone which show a few fixtures located at assumed points of installation, and possibly a circle (although this is often omitted) indicating where a soil stack may go? You say you cannot afford to refuse to bid on work for this reason because others would simply take the work away from you. Quite true, but supposing about 75 per cent. of the first-class plumbing firms absolutely refused to figure on such work unless each received a fee for the proper laying out of the work in condition to be bid upon?

Suppose, for instance, Mr. A. has plans drawn for a fine apartment house and gets in satisfactory bids for all the work except the plumbing, which the architect, Mr. B., tells Mr. A. is not being bid upon by the three best plumbing firms in town. Mr. A. wants to know why. Mr. B. says that the firms C., D. and E. have simply refused to bid on the work. Mr. A. goes to C., D. and E. and is told the plans for the building are not in condition to make any accurate estimate upon, but that if he wishes each firm to lay out the plumbing system and then to bid he will have to pay a fee to each amounting to the cost of such laying out. Now it won't take Mr. A. very long to tell Mr. B. to prepare a proper set of plumbing plans with details sufficient for accurate and quick estimating, and Mr. B. will never again, if he is a wise architect, let his important plumbing work out in such a way as to lay himself liable to a repetition of this experience. Neither will he *want* to after he finds the great advantages and clearness of the plans such as will be illustrated here.

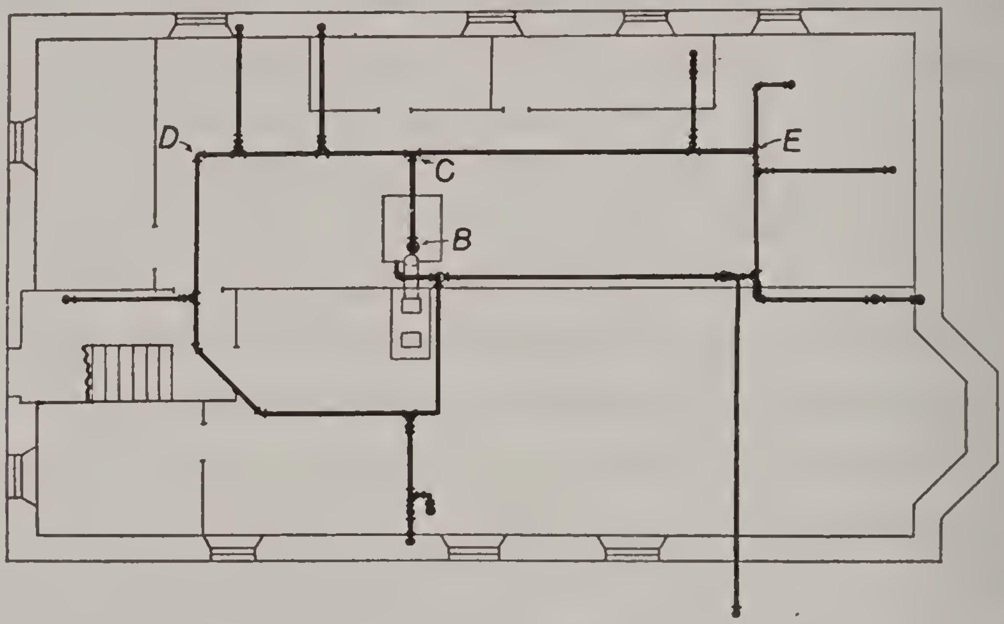


Fig. 1—Diagram Explaining Term: ''Floor Plan''

Another reason why plumbing plans have been the last of all the trade drawings to receive proper attention also rests on the plumbers' shoulders. This is the fact that the average small plumber cannot properly read a drawing. Perhaps he left school at 16 years of age, served his time as helper, worked hard as a plumber, saved a little money until he could start a shop of his own and now has a modest business which pays him usually, though not always, a living wage after his expenses are deducted.

All along he has had little time, opportunity or inclination for study or mental expansion. This is not to a large degree a plumber's fault, and he is to be most heartily commended for rising to the level which he has attained; but if he is a man worth his salt he wants his business to grow, to handle larger jobs, to cease doing the actual work himself and to begin looking after his work; he wants to get well-paying work, to drive around with a horse and buggy (perhaps later in an automobile) inspecting his jobs, tracing up shipments of material, bidding on new work and all the other duties and pleasures devolving on the successful plumber. He perhaps obtains more capital for his business by becoming a plumbing contractor or even head of a plumbing corporation. There is absolutely no limit to where you can get except this:

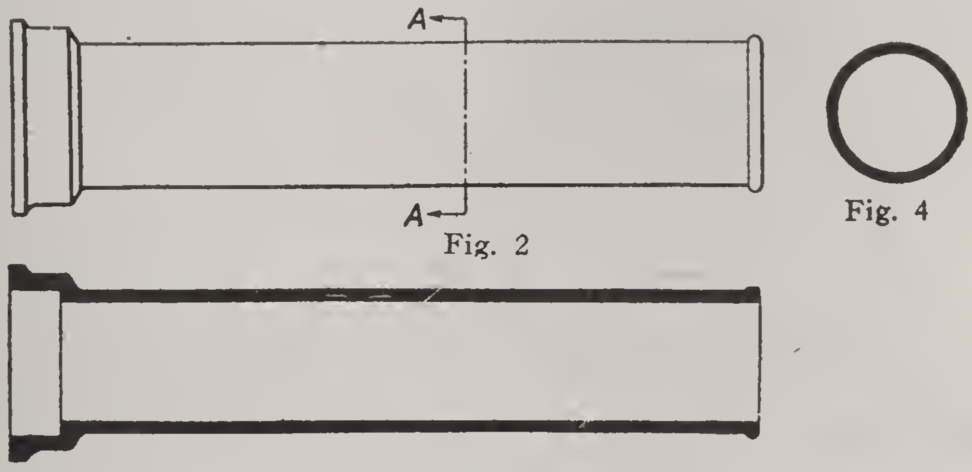


Fig. 2

Fig. 3

Fig. 4

Diagrams Explaining Various Drafting Terms

Fig. 2 is an "elevation"; Fig. 3, a longitudinal cross section, and Fig. 4, a cross section along the line A-A in Fig. 2, all of an ordinary length of cast iron pipe.

You have got to get over using your hands and not your brains! You have got to study and fit yourself for higher duties or you will fail when the job comes along which may, on one hand, be the stepping stone to carry you higher, or, on the other, the means of bankrupting you financially or of spoiling your reputation for the future. If you are too old to begin to sit up and take notice, if you are too set in your ways to fall into new ones, get a young man to help you out. Laugh at him as you will over mistakes he makes through his lack of practical experience. If he is the kind of man you need, he will have the technical knowledge you have missed—if *you* know how to make a wiped joint, *he* knows how to read a print; if *you* know the present price of cast-iron pipe, *he* can count up your quantity required down to the last length from the proper plans, and *together,* you will both get much farther than *separately.*

If you are too old to learn, start in now and learn the meaning and use of an isometric drawing as a beginning, and feel sure that you are not wasting your time. One reason why architects have been slow about giving you plans is that the average plumber doesn't pay much attention to them anyway simply because he doesn't understand them, won't take the time to learn, and probably thinks that anything he doesn't understand is foolishness anyway. Remember this, Mr. Plumber, that the plumber who cannot install and estimate plumbing work from such a set of plans as are here presented will not 10 years from now be very far beyond the point where he is today. The average machinist who *today* cannot read a drawing is *nowhere,* and the average plumber who in the near future cannot read a drawing will be keeping him close company.

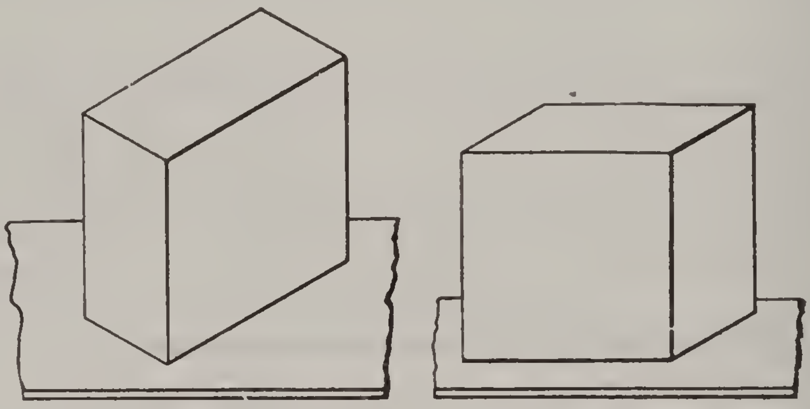


Fig. 5 Fig. 6

Diagrams Showing Difference Between True Isometric, Fig. 5, and Oblique Projection, Fig. 6

Doubtless most readers are familiar with the most common type of drawing, namely, the "plan," which is a view of anything looking down from above directly on to an object. Fig. 1 is the basement "floor plan," for instance, of a small house. The next most common type of drawing is the "elevation" or "cross-section." If you were to stand out in the street and look directly at the front or side of a building you would see what is called an elevation of the building, but if they had torn or cut out the front or side wall, leaving exposed the *edges* or cross-section of the floors and vertical walls, you would be looking at what is called a cross-section. In making drawings, of course, the cross-section or cut is made on some arbitrary line (often on the center line), and to illustrate more completely Fig. 2 shows an elevation of a length of cast-iron soil pipe and Fig. 3 a cross-section of the same pipe (the section being taken along the center line), and Fig. 4 a cross-section of the pipe taken at the arbitrary line A-A shown on Fig. 2.

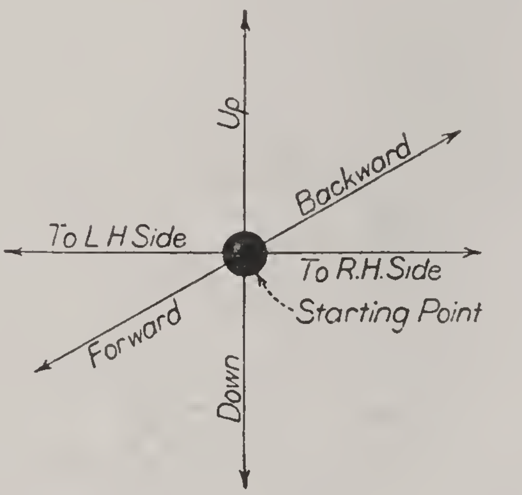


Fig. 7—Direction of Lines in Isometric Drawing and Their Meaning

Now having this firmly fixed in mind it will not be hard to see that to follow out the piping scheme of an ordinarily large job would require the following of a pipe through several drawings to determine its point of beginning, its run, its branches and its point of ending. For instance, to follow up one soil stack alone, which begins in the basement and extends above the roof, would require inspection of a basement plan, first floor plan, second floor plan, and so on up to the attic plan and roof plan, in order to determine the number and length of offsets and what fixtures empty into it. This is tedious and exasperating for the average engineer, architect and draughtsman, to say nothing of the poor plumber who is more or less a stranger to the drawing school, and to overcome this difficulty the isometric diagram and oblique projection diagram have been evolved to show at almost a glance the complete layout of any piping system, all offsets, bends, branches and even the fixtures of which the system takes care.

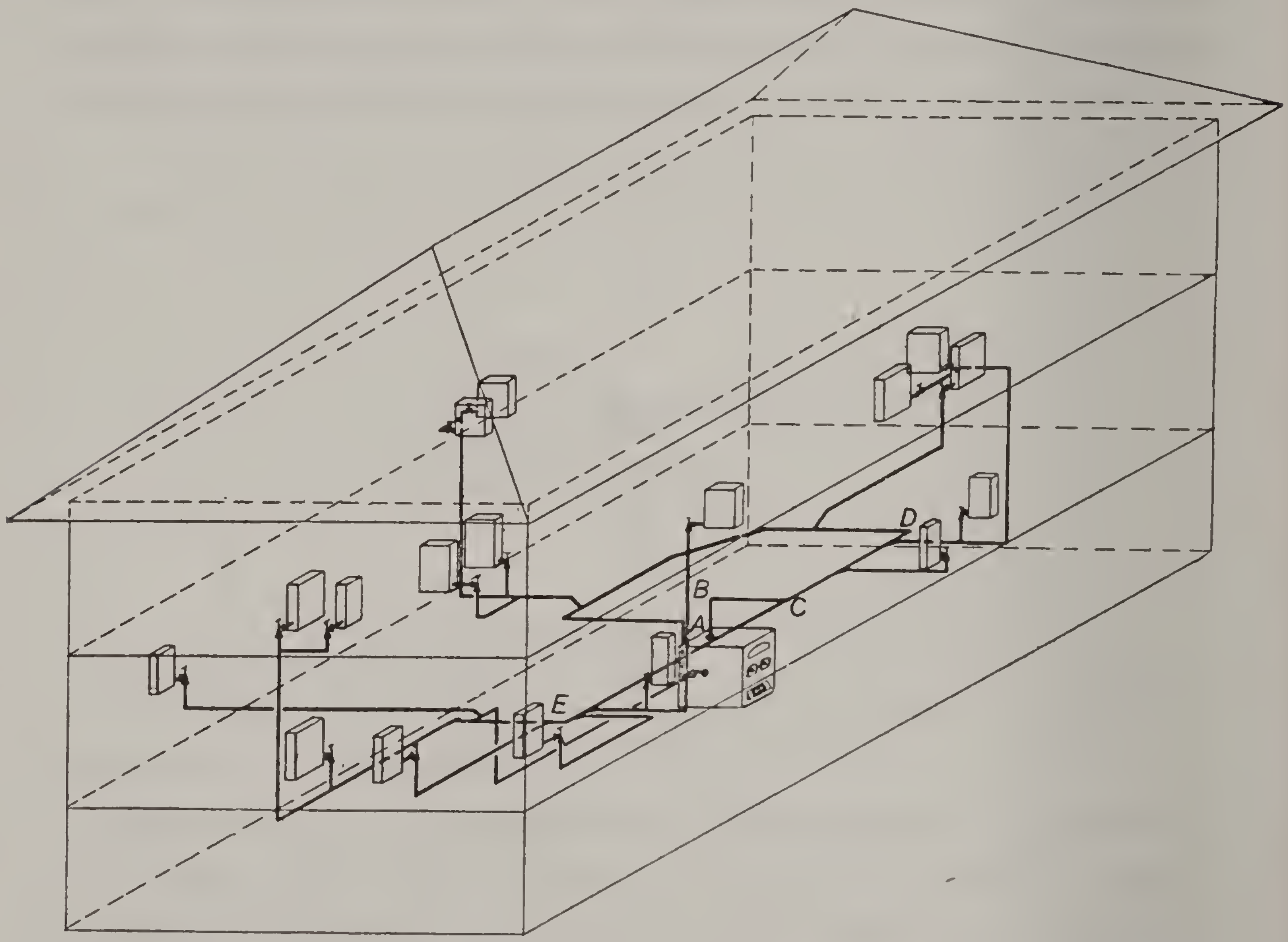


Fig. 8—Diagram Showing Advantage of Isometric Drawings in Estimating

The difference between the true isometric and the oblique projection is shown in Fig. 5, which is an isometric of a box, and Fig. 6, which is an oblique projection of the same box and at the same scale. Both views are in common parlance called simply "isometrics," and, as will be noticed, there are fewer angular lines on Fig. 6 and it occupies less space. Therefore the author finds this figure easier to draw, easier to read and easier for the novice to understand. Owing to this, the explanation following should be interpreted to apply to Fig. 6 only.

On inspecting Fig. 6 closely it will be seen that it is composed of lines running in three directions, that all lines which are up and down (vertical) lines on the real box are shown as running in an up and down direction from the top to the bottom of the page; that all lines which run from side to side across the face or back of the box (horizontal lines) are shown in a similar manner on the drawing running in a direction from side to side of the page, and that all lines running from the front to the back of the box (also horizontal lines) are shown at an angle of 30 deg. from the true horizontal lines in the drawing and running from the lower left-hand side toward the upper right-hand side. Fig. 7 shows graphically what direction each line takes from a starting point in an isometric and what it indicates when so drawn.

To get down to a concrete example, Fig. 8 shows a very simple isometric of a little steam-heating plant with a hot-water boiler and steam coil. Starting in at the steam boiler the supply pipe is shown running up and down the page between points A and B, which, of course, indicates that the pipe rises vertically for this distance, which can easily be scaled from the original drawing. Then turning at the elbow at B it runs to C, which, by referring to Fig. 7, we find is a horizontal (or level) run and extends toward the side of the building. At C the header splits into two mains, one running at an angle toward the right-hand side to D, which we know is a horizontal run toward the back of the building, and the other at an angle toward the left-hand side to E, which we know is the opposite to the other run or horizontally toward the front of the building. By following the same method it is an easy matter after a little familiarity to determine almost at a glance that the mains run level around the cellar until all the radiator risers have been taken off and that they then drop down to a wet return, coming back to the boiler below the water line.

When this simple layout is mastered it will doubtless interest the plumber to turn to Fig. 9, which shows the hot-water service system for a large residence recently built.

Following the method and rules already given it is easy to see that the main hot-water supply is from the basement boiler and that it rises in a 2-in. line to the top of the house, splits into several *horizontal* or *level* lines running to the points where the drops are located, and following down the drops will show each and every branch to each and every fixture, until the bottom of the drop is reached, where *horizontal* or *level* lines are shown running back to the boiler, showing that the main system is circulatory. Starting at the kitchen boiler it will be seen that the 1-in. supply is run to the various fixtures without any return run, showing that this system is not a circulating one. Does not this convey more to one who understands an "isometric" in less time than by any other known method?

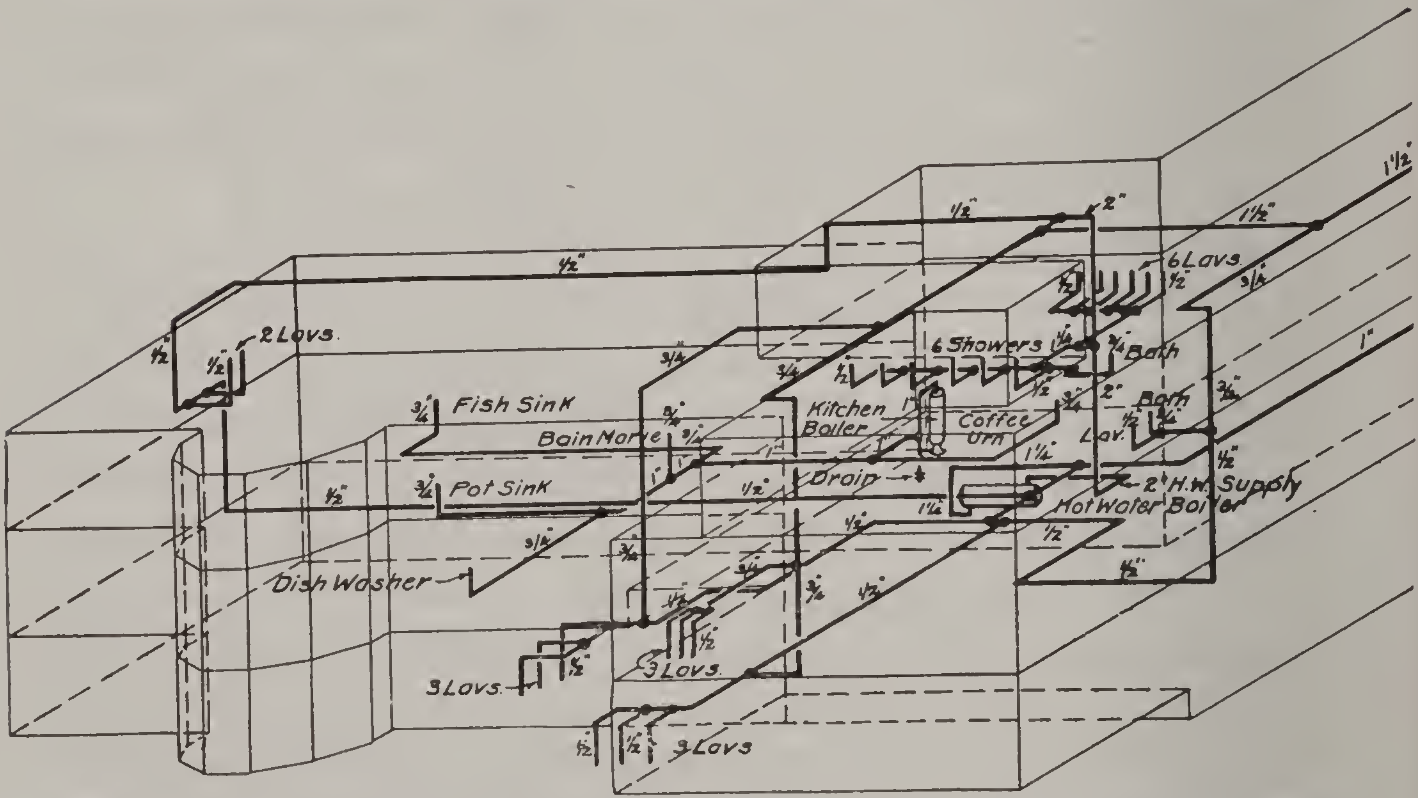
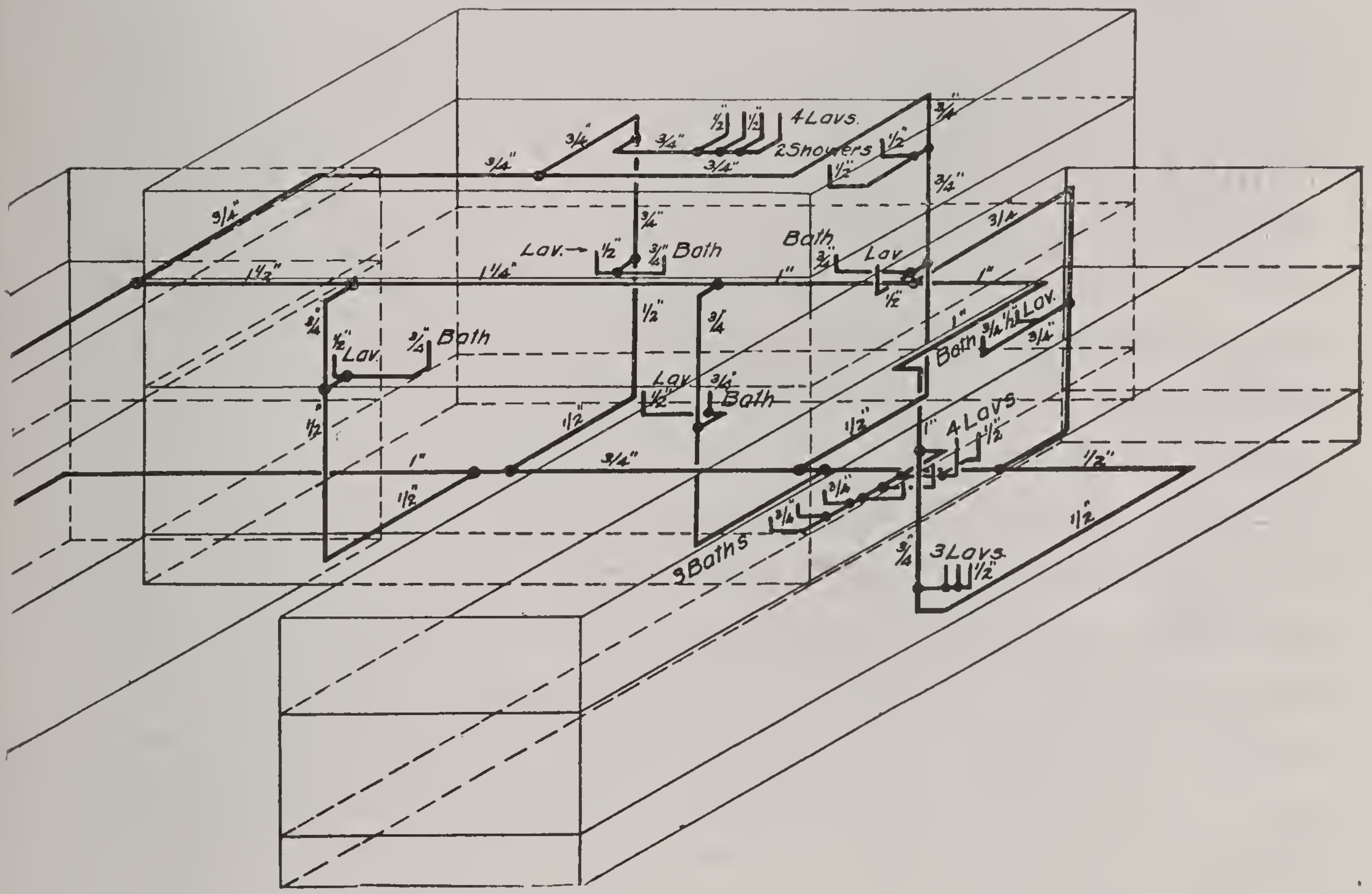


Fig. 9—Isometric Drawing of Hot Water Service for Large Residence. This Drawing was Used by the Plumber in Making up the Estimate

Now as to the value and application of "isometrics" to the plumber. In an "isometric" drawn true to scale like Fig. 9, a plumber should be able with a pocket scale to take off 95 per cent. correct the amount of pipe and fittings necessary for the system in about 10 minutes. The same is true for the cold-water system and any other piping installations of like nature. Besides this the isometric is an invaluable check for showing up any pockets which may exist in the lines and for which special means of drainage must be installed. It also (by the addition of a few arrows) can be made to indicate the pitch of all hot-water pipes in order to secure perfect circulation or relief from air binding, and it makes sure that sufficient pipe necessary to bring the returns back from each circulating drop will be figured in by the estimator. Beyond all this, counting up the number of fixtures taken care of on the isometric and checking them off on the architect's drawings will show immediately whether piping for all fixtures has been figured or whether the plumber has left some out on his estimate.



It would seem that the small cost of producing a proper set of plans and specifications should make it expedient from the owner's standpoint, convenient from the architect's standpoint and very necessary from the successful and honest plumber's standpoint that they be supplied. Some may ask as to what is meant by "small cost," saying that their experience has been that for satisfactory work of this kind the cost has been anything but small. By actual experience the author has found that to prepare the most complete set of plumbing plans and specifications such as are now used by the best and foremost architects (or even better and slightly more complete as to details) costs about 2 per cent. of the plumber's estimate. That is to say that this includes taking the common architectural plans, showing the toilet rooms and number of fixtures desired, and making a complete basement plan, first floor plan and separate plans for each floor up to the roof, showing every fixture piped up, every riser and its size, every fitting necessary; then an elevation of each soil and vent stack showing every outlet and its size at each floor (for roughing-in) and also isometric drawings of the hot-water system, cold-water system, fire-protection system, flushing-water system and topped off with typical details of connections for one of each kind of fixture in the building, all the above being covered by a most complete specification running from the hot-water boilers down to the rubber stoppers and china index plates used on the fixtures.

On a job figuring to cost $5000 these plans and specifications can be produced for about $100. The plumber who jeopardizes a $2000 job of his own by taking a chance on the installation is more than the 2 per cent. foolish; he is laying himself liable, if he slips up anywhere, to having the job remembered and used as an argument against him by his competitors long after a hundred other jobs (which he may have done satisfactorily) are forgotten. An example:

Recently a plumber, owner of a reasonable sized shop, said to me, ''Did you ever see a hot-water circulating system that *circulated?*'' ''Why,'' I answered, ''any hot-water system properly installed will circulate just the same as any hot-water boiler connected to a stove.'' ''Well, I never saw one yet,'' said he. Shortly after that I had an opportunity to look over one of his ''circulating'' systems with which trouble was experienced, and found that, although carefully pitched in general, the return line was run with a pocket which almost entirely stopped the circulation. That was evidently why he had never had success in installing circulating hot water. This cost $500 and was a failure until some other plumber remedied the fault. What did he make by saving his 2 per cent. or $10 there?

It would seem, however, that until plumbing plans and plumbing isometrics are more widely used and demanded the plumber will either have to go without, take the risk on the jobs due to lack of proper sanitary and engineering training, or else pay to have his own plans made. That is a matter of business policy which every plumber must settle for himself, as no one can force him to drink even though he has been led to the clear waters of safety and surety as indicated in this article.

PLUMBING PLANS WHICH SIMPLIFY ESTIMATING

How to Use Properly Prepared Plans to Obtain Accuracy in Estimating—Typical Set of Such Drawings—Special Advantages of the Isometric Method of Pipe Plan Drafting

By H. N. Oman

With the idea of not only assisting the plumber in learning how to read plans easily and accurately but also of showing him the advantage of having properly prepared plans when he wishes to make up an estimate and not omit therefrom any of the materials or fixtures, I have prepared the accompanying illustrations to represent a perfect set of plumbing plans. I will attempt to explain them fully and point out how much assistance is given to a plumber in making up an estimate and in installing the work if the owner or architect has furnished him with a set of proper plans on which full particulars on the plumbing system are designated.

A short time ago I handed a plumber an isometric drawing of a hot-water system consisting of a boiler and a hot-water riser supplying two bath rooms, a cross over at the top and a hot-water return dropping down and supplying two kitchens and then run back to the boiler again. This man was a plumber of average intelligence and his plumbing work was fully up to the usual standard, but it was absolutely impossible for him to make his connections up correctly from this isometric drawing, and even when the differences were pointed out to him he could not understand from the drawing what was indicated.

As long as this is the case no architect is likely to spend time or money making plans which are of no avail, or which are partly followed out according to the architect's idea, and then finished up according to the plumber's, resulting possibly in a sanitary chaos with no system or proper results. Even a comparatively poor scheme systematically followed out may be better than a good scheme sadly mutilated, for the mutilations often make of absolutely negative value many of the better points installed.

It has been endeavored to show here a typical set of plumbing plans for a fairly large size suburban house. This is such a set as is given out by a large number of architects doing the better class of work to plumbing firms who are capable of following out these plans and of making an intelligent installation therefrom.

In the first place a plan of each floor is almost always furnished with the fixtures and horizontal runs for that floor located thereon. Besides this, elevations of each soil stack with its corresponding vent line and the soil and vent outlet connections at each floor should also be given, then a typical larger scale drawing of the connections, including soil, waste and water supply, for one fixture of each of the various kinds used in the building. Besides this there should be individual isometric drawings for each water supply system so that the scheme of connections, size of pipe and number of outlets on each branch are shown on a single drawing and may thus be ascertained at a glance. These isometric drawings should be made to scale and are a great aid in estimating the amount of pipe required, being sometimes even carried out in the drainage pipe system of more complicated installations.

Fig. 1 represents the basement floor of the suburban house taken for example, and shows the location, size and designating number of all soil stacks and how they are connected up through the horizontal house drain, together with the location of the house trap and fresh-air inlet. It is left to the plumber to decide the exact distance below the ceiling at which this pipe is to be run, where it is marked ''On Ceiling,'' and of course where it

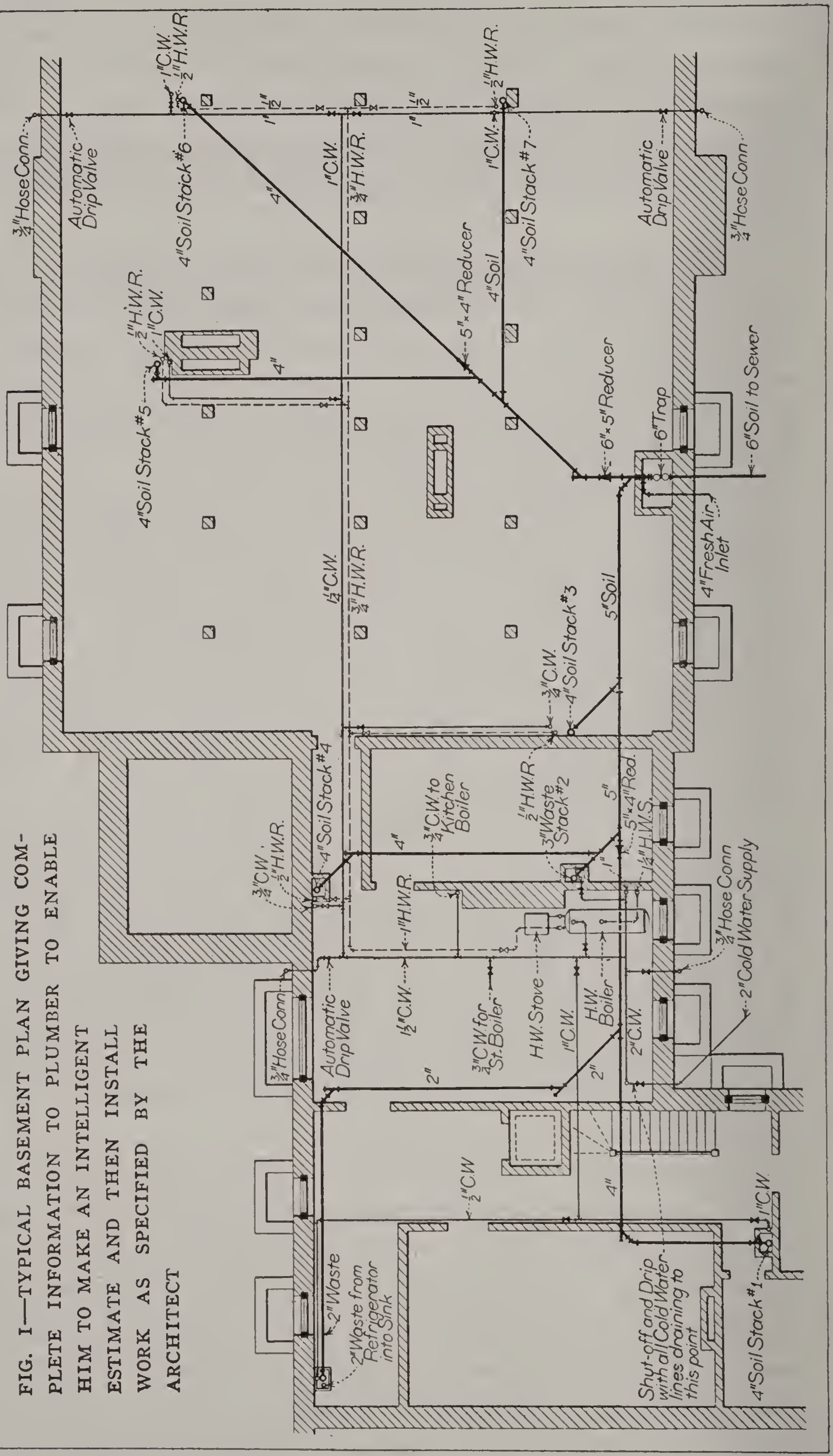


FIG. I—TYPICAL BASEMENT PLAN GIVING COMPLETE INFORMATION TO PLUMBER TO ENABLE HIM TO MAKE AN INTELLIGENT ESTIMATE AND THEN INSTALL WORK AS SPECIFIED BY THE ARCHITECT

is underground (as shown here) it will be kept as near the surface as possible with the necessary pitch for drainage.

The pits for cleanouts and traps are constructed of brick by the general contractor and all the plumber has to do is to provide cast-iron covers for same. Of course, if expense is not of first importance, cleanout pits should be constructed at the base of every stack, at all changes in direction of the house drain and at every buried trap. As the use of these cleanouts is only a more or less remote possibility, the pits are sometimes omitted except at a few of the most advantageous points. The plan shows a few pits as examples at some of the cleanout locations, but a first-class job would require them at all points where access may be necessary at any future time.

On this basement plan is also shown how the water supply is brought into the house, where the shut-off cock and drip valve are located, and how the pipe is branched or reduced in size and where every service-water riser is located. Careful inspection also shows where the hot-water boiler is located, the position of the hot-water stove and how all the hot water for the owner's portion of the house is taken from the boiler in a single 1¼-in. line and carried up to the upper floors.

Fig. 2 shows the first floor plan of the same building with each soil stack passing through this floor marked with its number and size, also all vent stacks and service water risers. This plan likewise shows the drainage pipe under the kitchen sink which is run into the grease trap below the sink and all the horizontal piping in the floor or ceiling above.

Figs. 3 and 4 show the second floor and attic plans with the various fixtures, risers, etc., the attic plan locating approximately the flush tank and showing how the hot water is distributed from the main supply riser to the various hot-water drops. It will be noticed that the hot water has been carried up in a single 1¼-in. rising line as before mentioned, and distributed horizontally in the

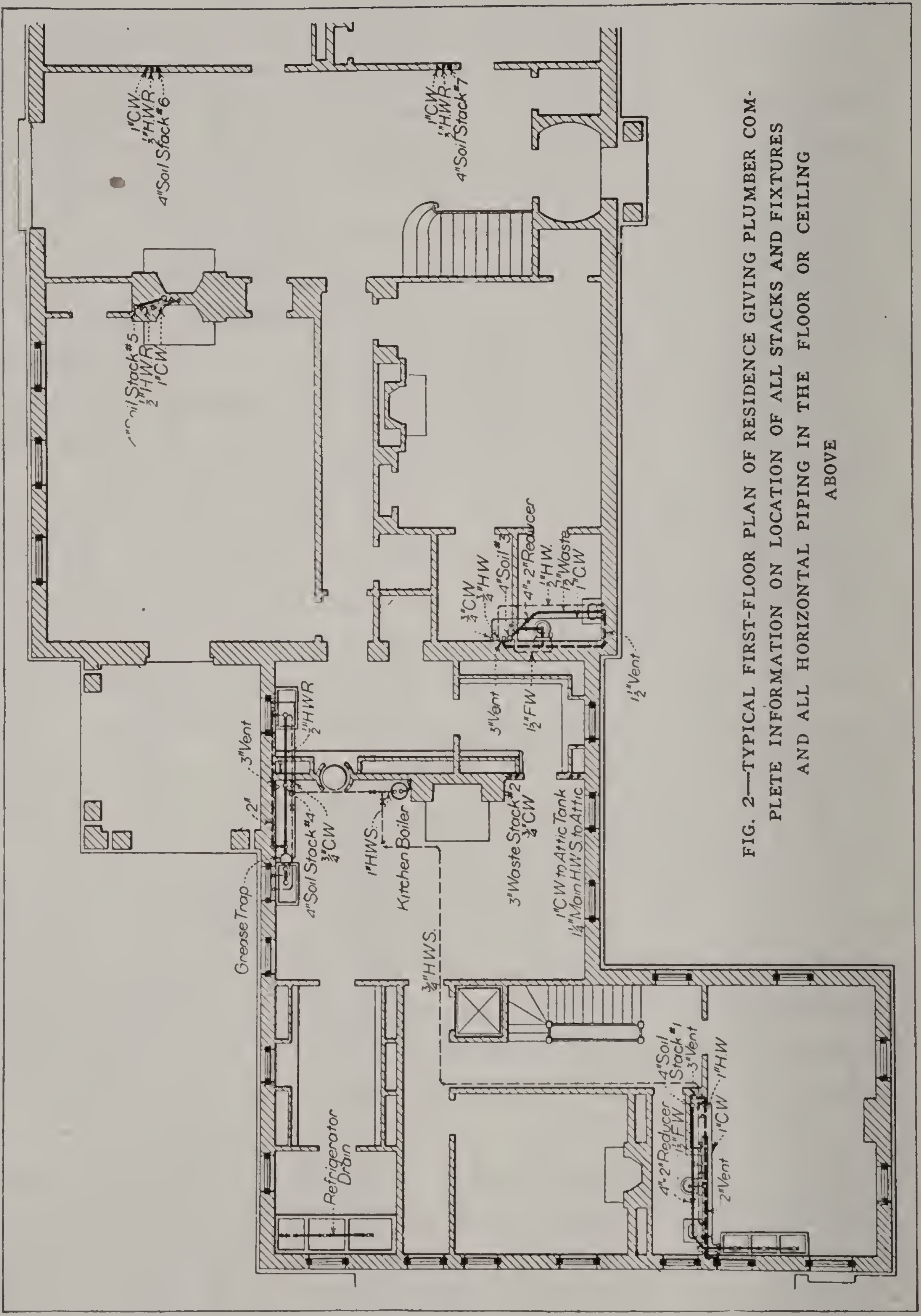


FIG. 2—TYPICAL FIRST-FLOOR PLAN OF RESIDENCE GIVING PLUMBER COMPLETE INFORMATION ON LOCATION OF ALL STACKS AND FIXTURES AND ALL HORIZONTAL PIPING IN THE FLOOR OR CEILING ABOVE

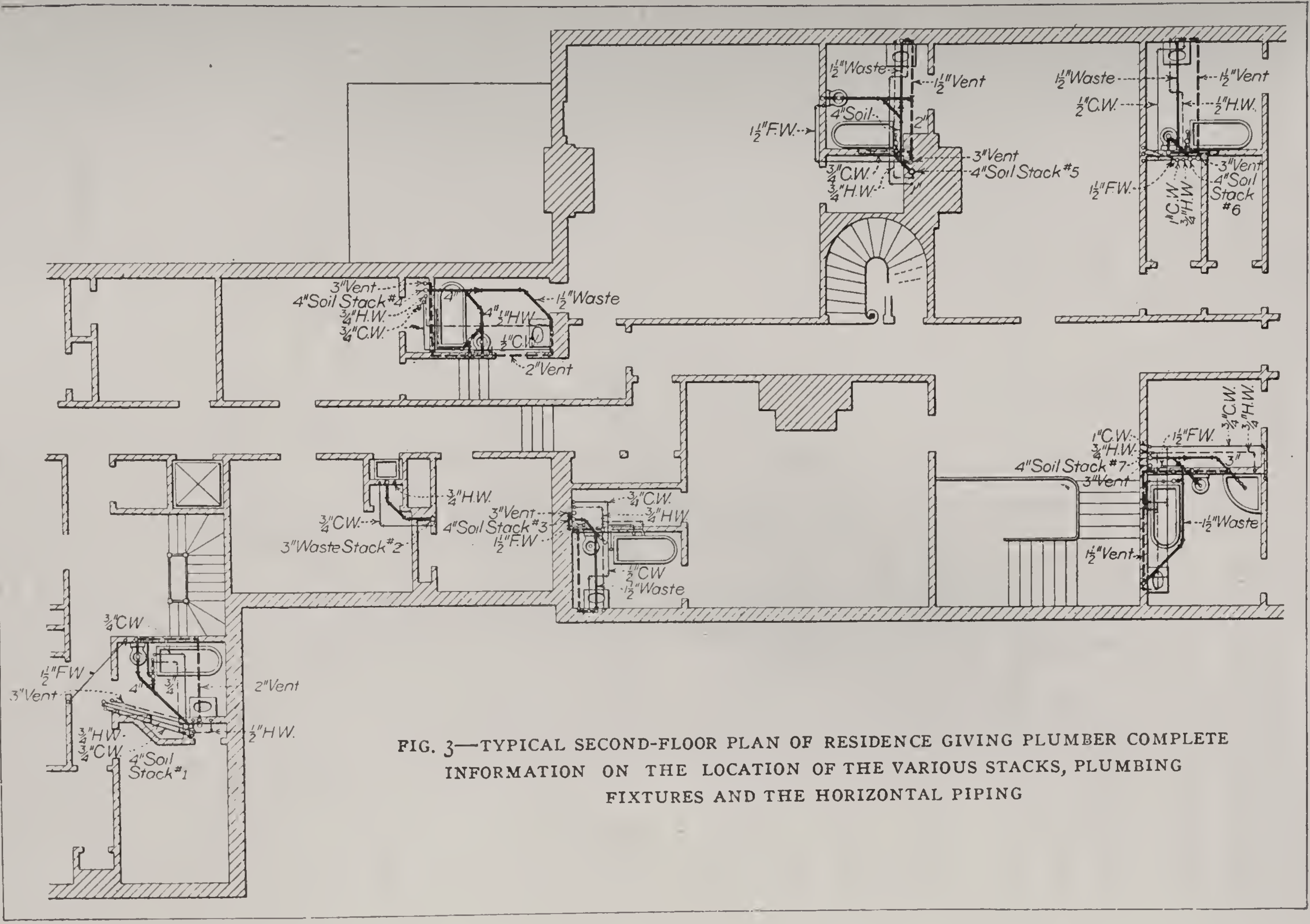


FIG. 3—TYPICAL SECOND-FLOOR PLAN OF RESIDENCE GIVING PLUMBER COMPLETE INFORMATION ON THE LOCATION OF THE VARIOUS STACKS, PLUMBING FIXTURES AND THE HORIZONTAL PIPING

attic floor and then dropped back at the points desired through the hot-water drops which are all connected together in the basement, and carried back to the hot-water boiler and stove as shown in plan on Fig. 1.

On Fig. 5 is shown an elevation of every soil and vent

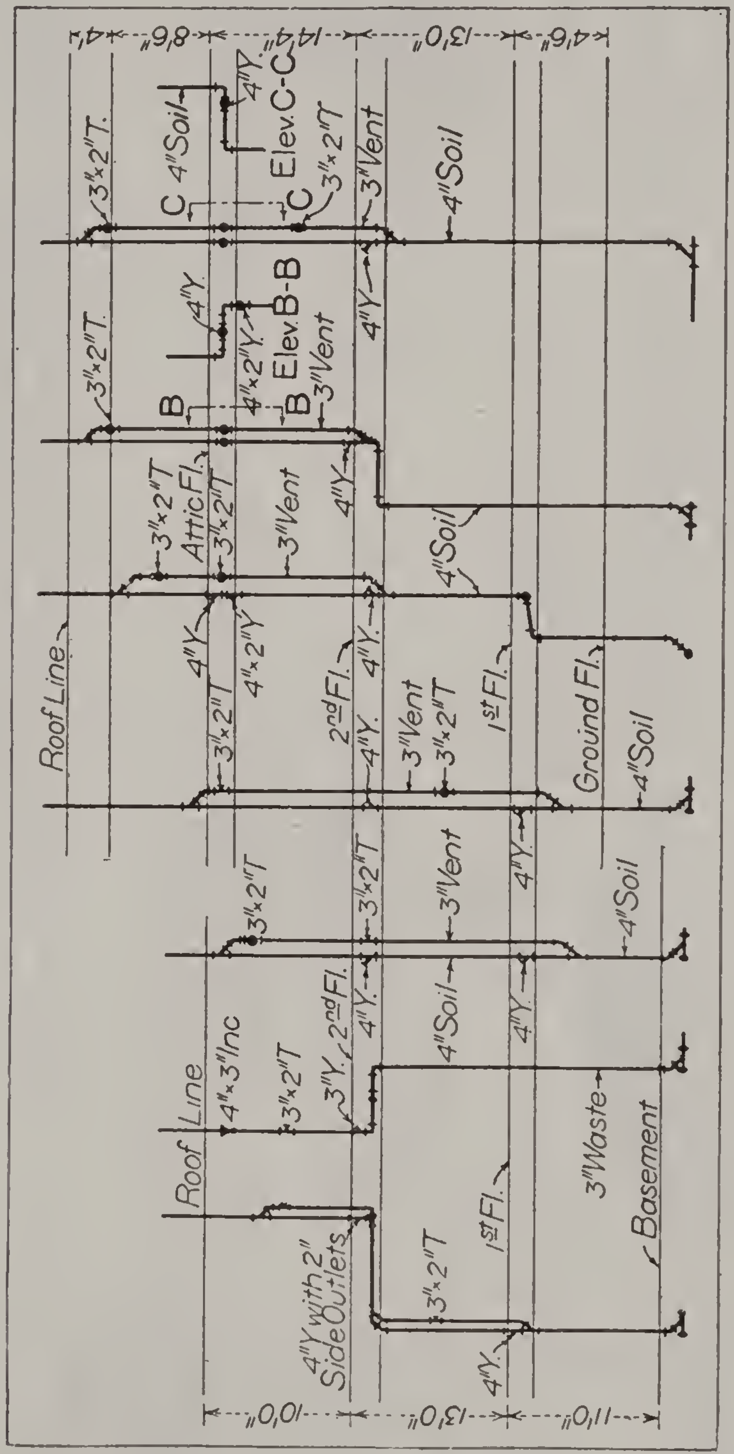


FIG. 5—ELEVATION OF ALL SOIL AND VENT STACKS FOR GUIDANCE IN ROUGHING IN WORK TO AVOID OVERLOOKING ANY CONNECTIONS

stack with the soil and vent outlets, which can be used in the roughing-in to make sure that the plumber has not forgotten connections for any fixture, thus making the breaking open of a stack unnecessary on this account. It is also extremely useful in counting up pipe and fittings for estimating purposes.

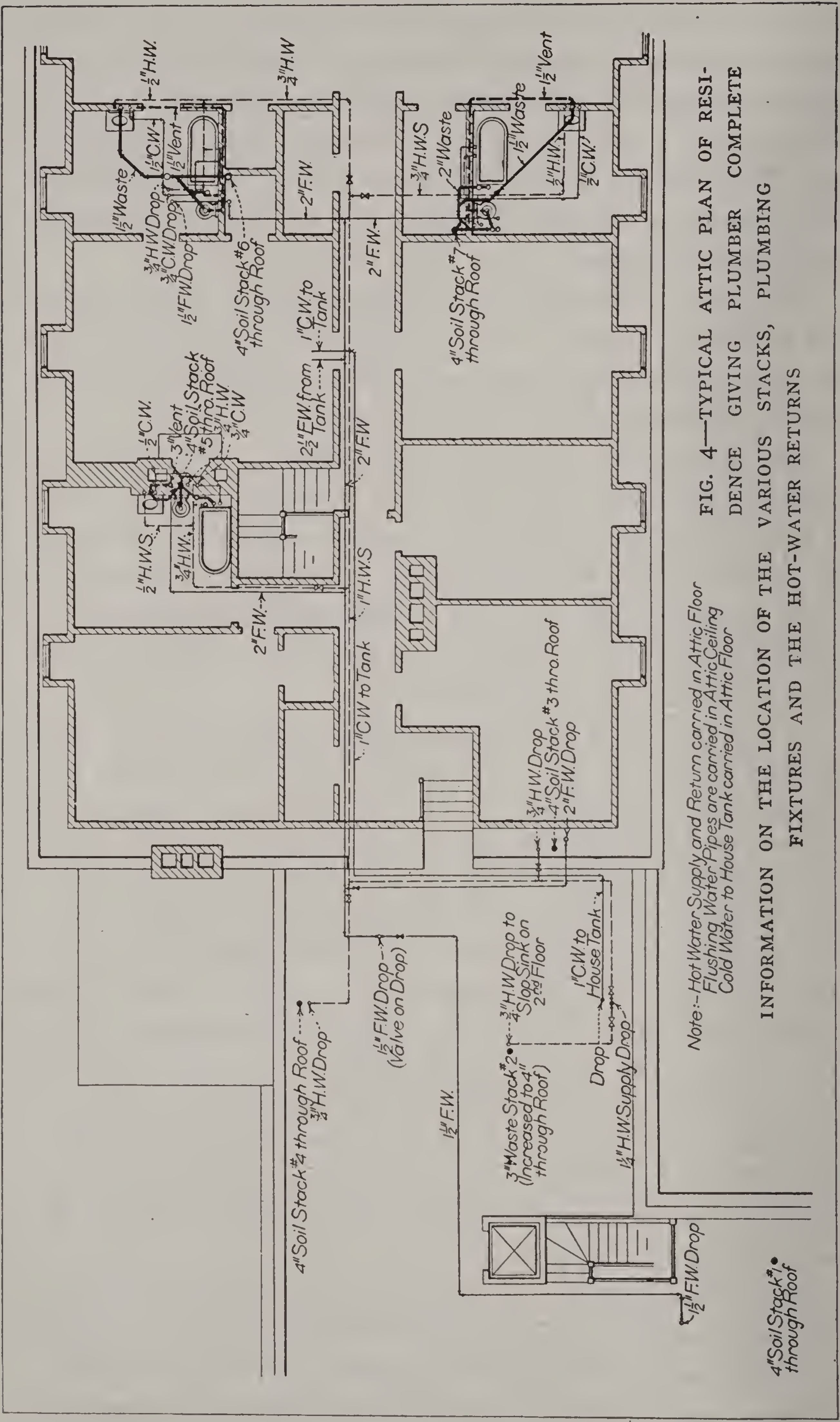
Fig. 6 is one of the most useful drawings and is commonly called an isometric diagram. This shows the cold water system all laid out to scale, and how the various fixtures are supplied, together with the sizes of the supply, the location of the principal valves, flush tank and other useful information which can be seen upon referring to the drawing.

Fig. 7 is a complementary drawing to Fig. 6, and shows the hot-water layout. When the water closets are placed on a separate flush-water system as in this case an isometric diagram is also shown of this as in Fig. 8.

For the average person an isometric diagram is more easily explainable than any other type of drawing. This is due to the fact that the isometric projection presents all points of a system somewhat in their respective locations to each other and are visible without referring to several different drawings as is the case with the simple plan and elevation or cross section.

It can be easily seen that to follow out the hot-water scheme shown by the floor plans only for instance one must refer successively first to the basement plan to see where the hot-water boiler and stove are located, where the hot-water supply is taken and where the riser is located; then to the first floor plan to see if the riser is carried straight up without branches or if supplies are taken from it and where they extend if so taken; then to the second floor plan to ascertain similar information; then to the attic plan to find out how the horizontal distribution is arranged; then back to the second floor plan to note each drop and its branches; then to the first floor plan for like knowledge; then to the basement plan to see how the returns are hooked up and carried back to the boiler again.

From this it can be seen that in order to get hold of the hot-water scheme it has been necessary to make at least seven different references to various sheets and at completion, unless every detail and connection is fixed and



Note:- Hot Water Supply and Return carried in Attic Floor
Flushing Water Pipes are carried in Attic Ceiling
Cold Water to House Tank carried in Attic Floor

FIG. 4—TYPICAL ATTIC PLAN OF RESIDENCE GIVING PLUMBER COMPLETE INFORMATION ON THE LOCATION OF THE VARIOUS STACKS, PLUMBING FIXTURES AND THE HOT-WATER RETURNS

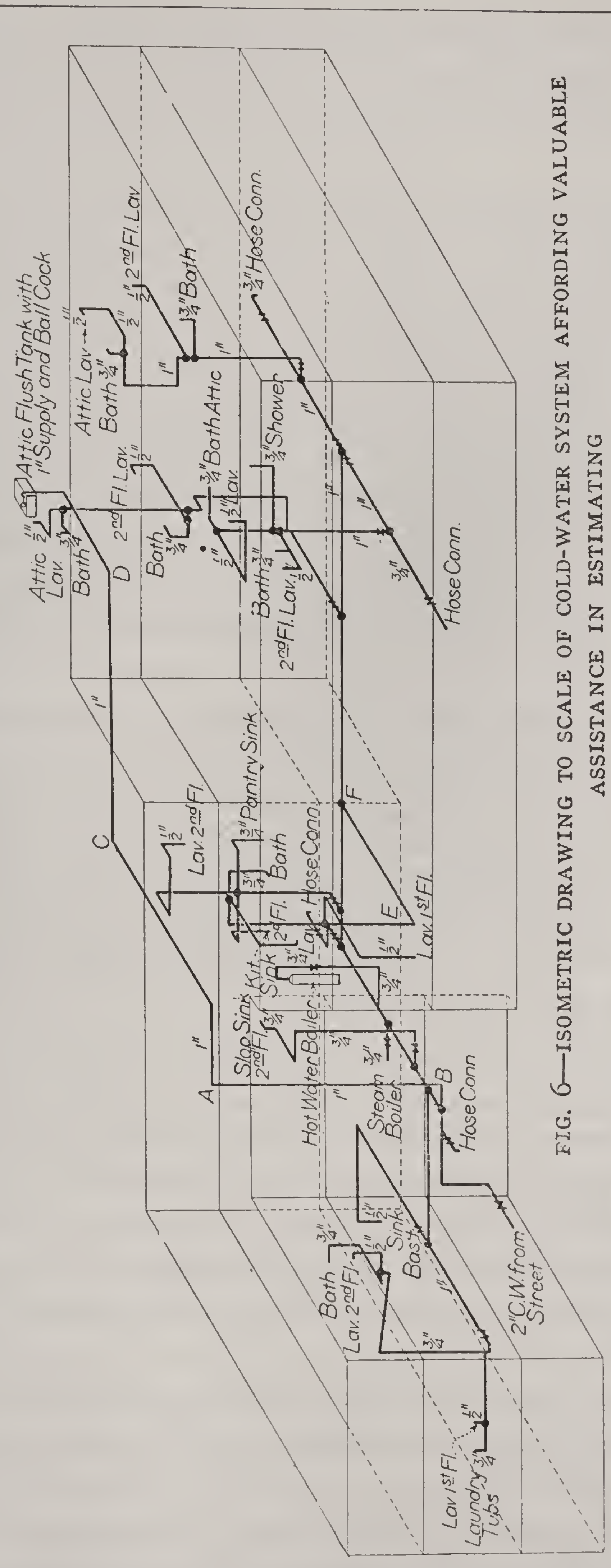


FIG. 6—ISOMETRIC DRAWING TO SCALE OF COLD-WATER SYSTEM AFFORDING VALUABLE ASSISTANCE IN ESTIMATING

held in the mind (which would indeed indicate an extraordinary mental luster), it is necessary to repeat the entire or at least part of the cycle of movements just outlined.

See the difference on picking up the isometric diagram! In the first place the general box-like outlines of the building around the piping give an idea where the piping is located, and it is quite unnecessary to look down at the title of the sheet to see if the particular pipe in question is at the attic level or in the basement. The hot-water boiler is easily located. The hot-water supply line can be followed without removing the eyes from the drawing, every valve, every branch, the horizontal distribution in the attic, every drop, every return in the basement and even the pitch of the pipe (indicated by arrows) is all comprehended.

More than this can be done, however. By counting up on the floor plans of the building the number of fixtures may be ascertained and by counting up the ones shown on the isometric an absolute check is found to prove the correctness of the diagram. Then it must be plain to the most skeptical even, that if every fixture is shown on the diagram, and pipe is shown to scale running to each fixture, all the pipe must be shown.

To apply this most advantageously, a scale can now be laid on each pipe successively and its length scaled off, while the sum of these lengths will be the actual amount of pipe required within probably a correctness of 95 per cent. In brass hot-water piping, for instance, this assurance of correct quantity is most valuable and necessary to the estimating plumber, while the time saved is enormous.

To scale a hot-water system such as shown in Fig. 6 should occupy about five minutes, or even less, while to obtain the same information from the plans only, Figs. 1 to 4 inclusive, and to allow for the variation in floor height for each riser, as shown in Fig. 5, would take much longer, and when finished it would not be nearly so certain that each fixture had been considered and every drop necessary had been supplied with hot water at the top and connected into a return at the bottom.

To count the main valves on an accurately made isometric is a matter of minutes, while to pick them out of the ordinary plans and figure on the others in the risers which the specifications may demand requires four, five, or even sometimes ten or twelve times as long.

It should be understood, however, that the isometric projection is a diagram, and a diagram only; that in order to find out if a riser is located in such-and-such a partition reference must be made to the floor plan at the level in question, and to find out if a pipe runs to the east of a doorway or to the west of it, reference must also be made to the floor plan.

The isometric projection is an excellent drawing to show up a general scheme of piping, for estimating, and for checking up air pockets and cold-water pockets, together with other faults; but the floor plan is the actual locating drawing and the one to determine where the pipes must be installed to make up the complete system as schemed in the isometric layout.

In using isometric diagrams all that it is necessary to remember is the fact that a line running up and down the sheet represents a riser or drop with the top of the riser toward the top of the sheet as at A in Fig. 6, and the bottome of the riser toward the bottom of the sheet as at B in Fig. 6; that a line running from the left side of the sheet toward the right side indicates a horizontal run across the building as C D in Fig. 6; and that a line running on an angle from the lower left hand corner toward the upper right hand corner indicates a horizontal run from front to rear of the building as shown in E F in Fig. 6.

On Fig. 9 is shown a detail of every toilet fixture installed and the method of making the soil vent and ser

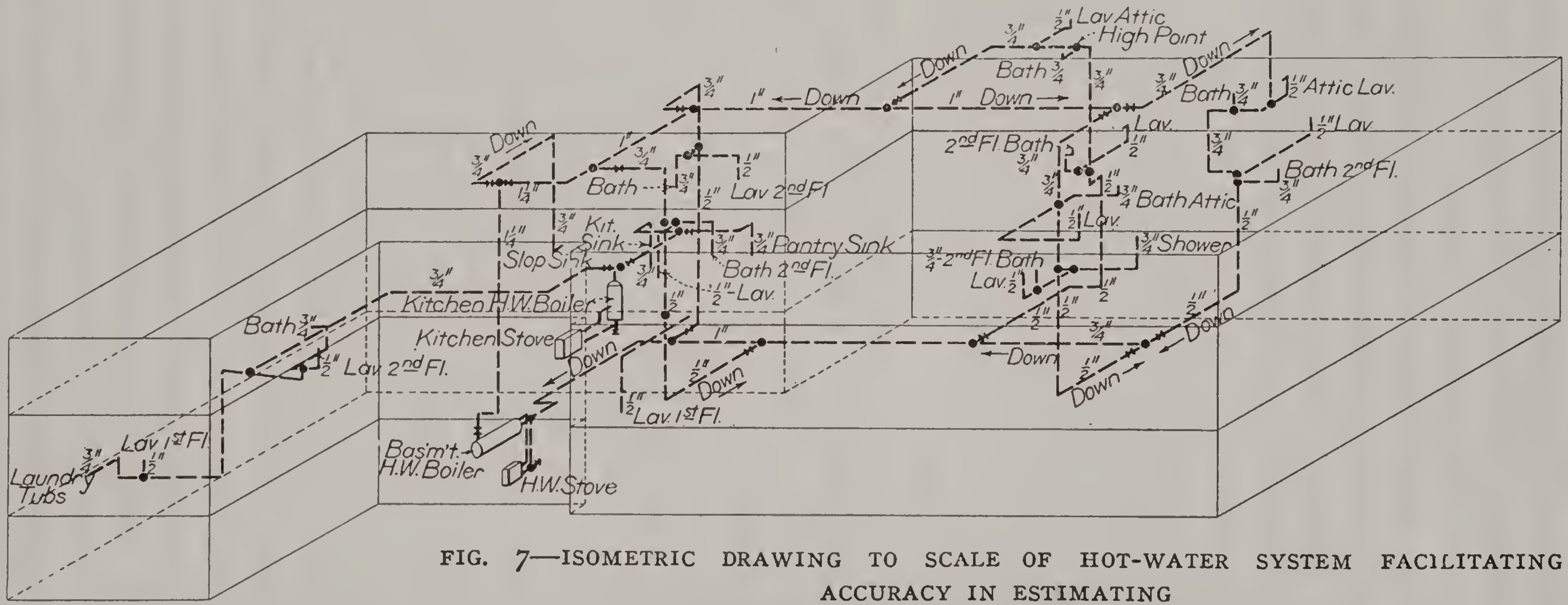


FIG. 7—ISOMETRIC DRAWING TO SCALE OF HOT-WATER SYSTEM FACILITATING ACCURACY IN ESTIMATING

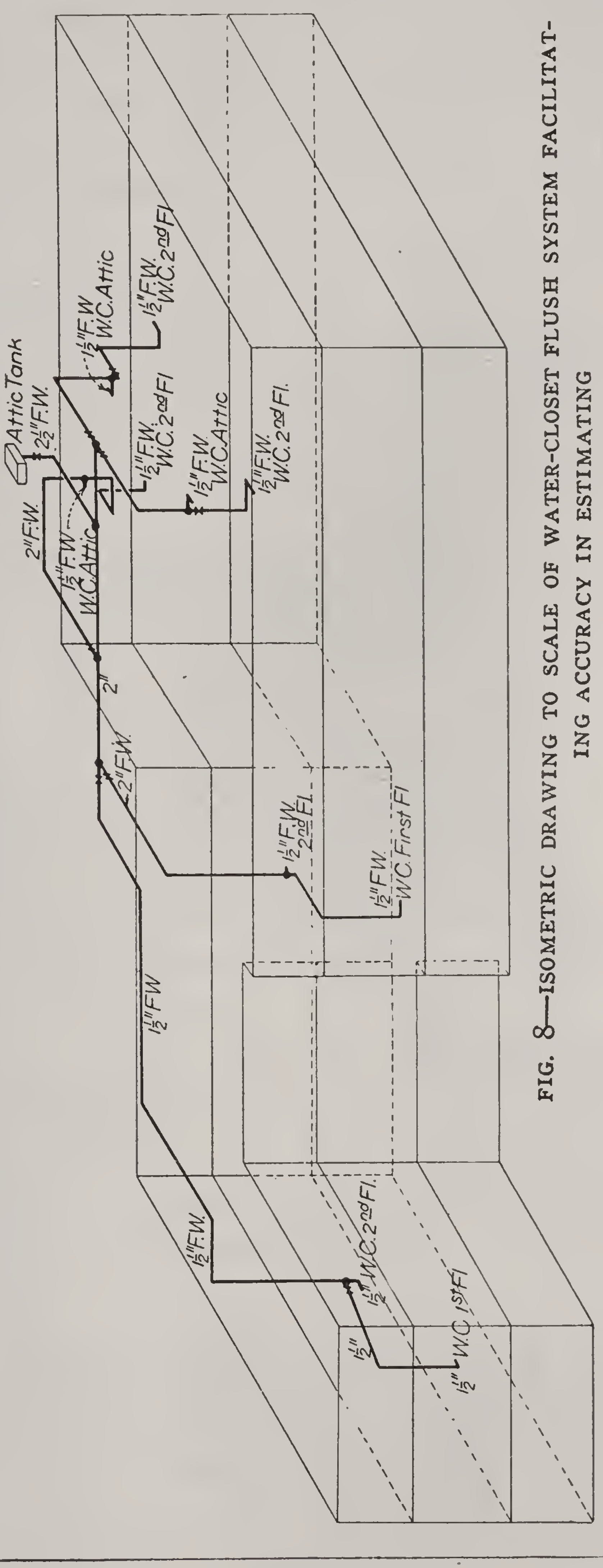


FIG. 8—ISOMETRIC DRAWING TO SCALE OF WATER-CLOSET FLUSH SYSTEM FACILITATING ACCURACY IN ESTIMATING

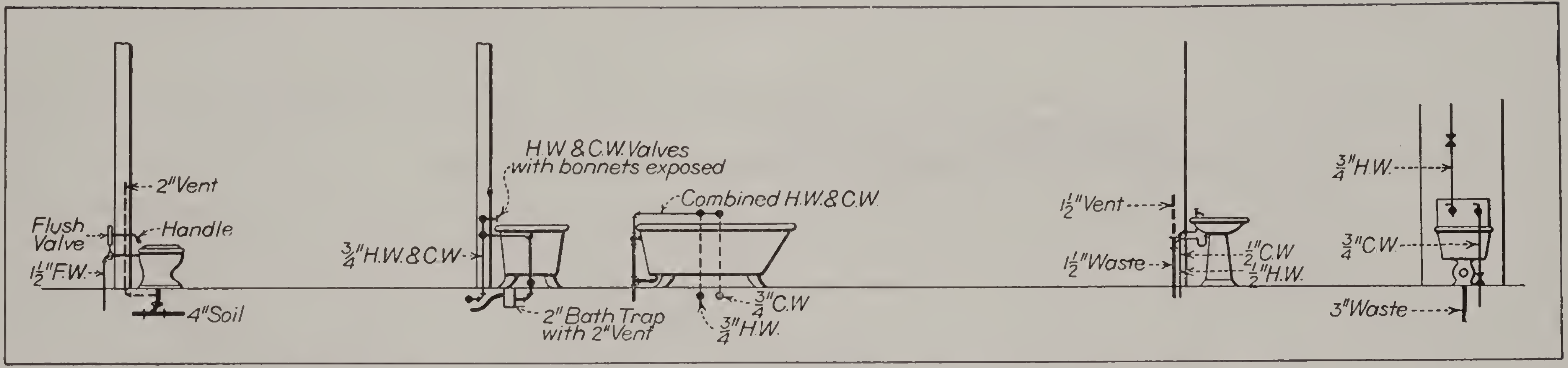


FIG. 9—DETAIL OF TOILET FIXTURES, SHOWING METHOD OF MAKING CONNECTIONS

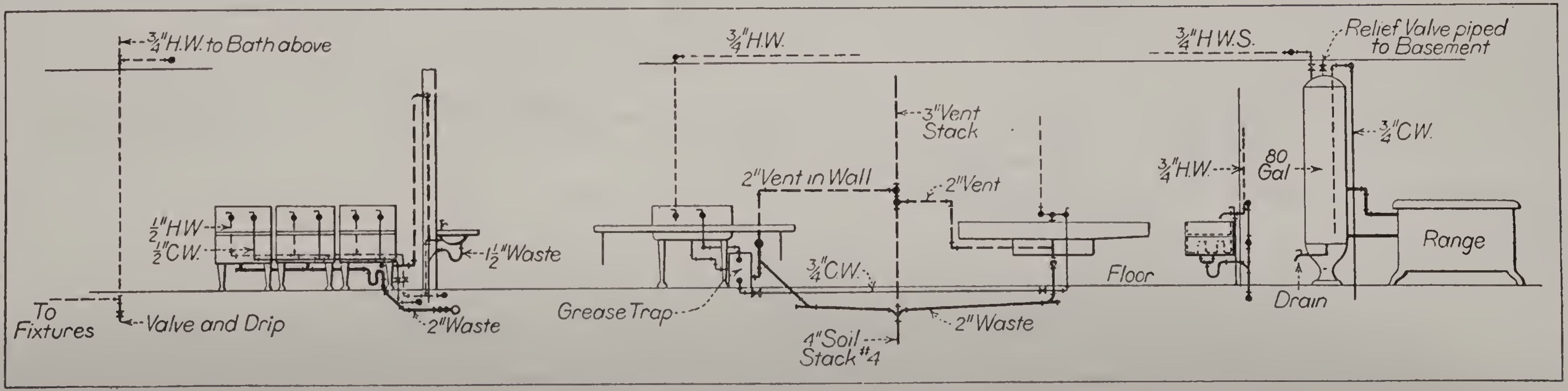


FIG. 11—DETAIL OF SEVERAL FIXTURES, SHOWING METHOD OF MAKING CONNECTIONS

vice connections. This, in combination with the roughing-in shown in Figs. 1, 2, 3, 4 and 5 and the further details shown in Fig. 10 and Fig. 11 carries the work from the street connections to the fixture and leaves no point open for dispute, argument, or financial loss. In Fig. 10 is shown a detail elevation of the connections around the hot-water boiler and hot-water stove in the basement and Fig. 11 elevations of the kitchen sink, grease trap, laundry tubs and pantry sink.

It would seem after a thorough inspection of these plans, that there is very little left to the imagination, and less still to the architect's more or less liberal interpretation as frequently happens with ambiguous wording and incomplete descriptions.

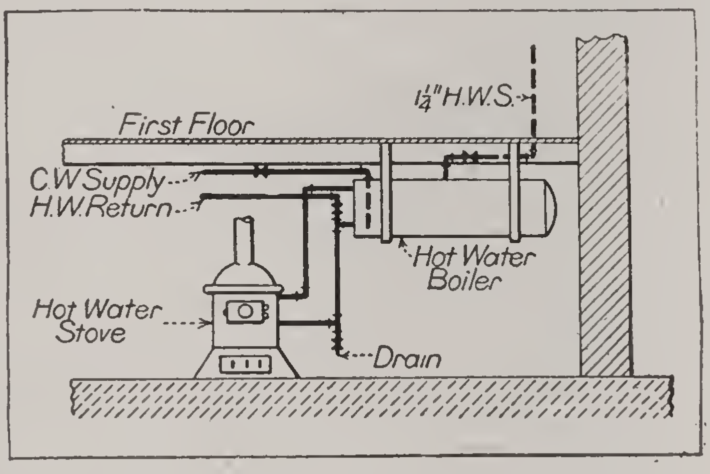


FIG. 10—DETAIL OF HEATER AND STORAGE TANK CONNECTIONS

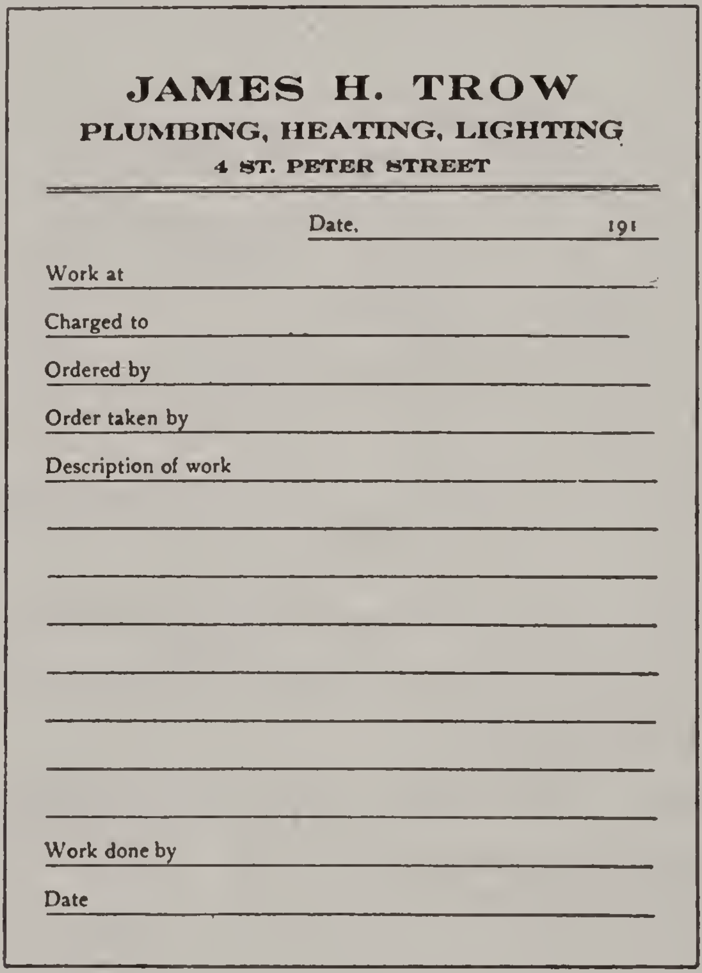
With proper plans and clear and complete specifications misunderstandings are not only avoided, but the contractor can afford to give proper work, the owner receives just what he pays for, and the architect avoids what it is to be hoped in the future will be termed by both the plumber and the architect as ''the late unpleasantness.''

The attention of the reader is called to the fact that owing to the reduction necessary in the original drawings, it is needful to look very closely to make out the various details in the more complicated portions.

MODERN OFFICE SYSTEMS FOR MODERN PLUMBERS

Methods Applicable to Large or Small Businesses Which Have Been Found Accurate and Economical by Two Prominent New England Firms

Two leading members of the Massachusetts State Association of Master Plumbers have evolved smoothly working business systems to suit their individual requirements. The business of one differs in nature and scope from the other in that the one is centered in one shop while the other is operated through several shops. These men are both active association workers and have been untiring in their efforts to elevate the standing of the plumber and assist him in conducting his business on high class and profitable lines.



JAMES H. TROW
PLUMBING, HEATING, LIGHTING
4 ST. PETER STREET

Date. 191

Work at

Charged to

Ordered by

Order taken by

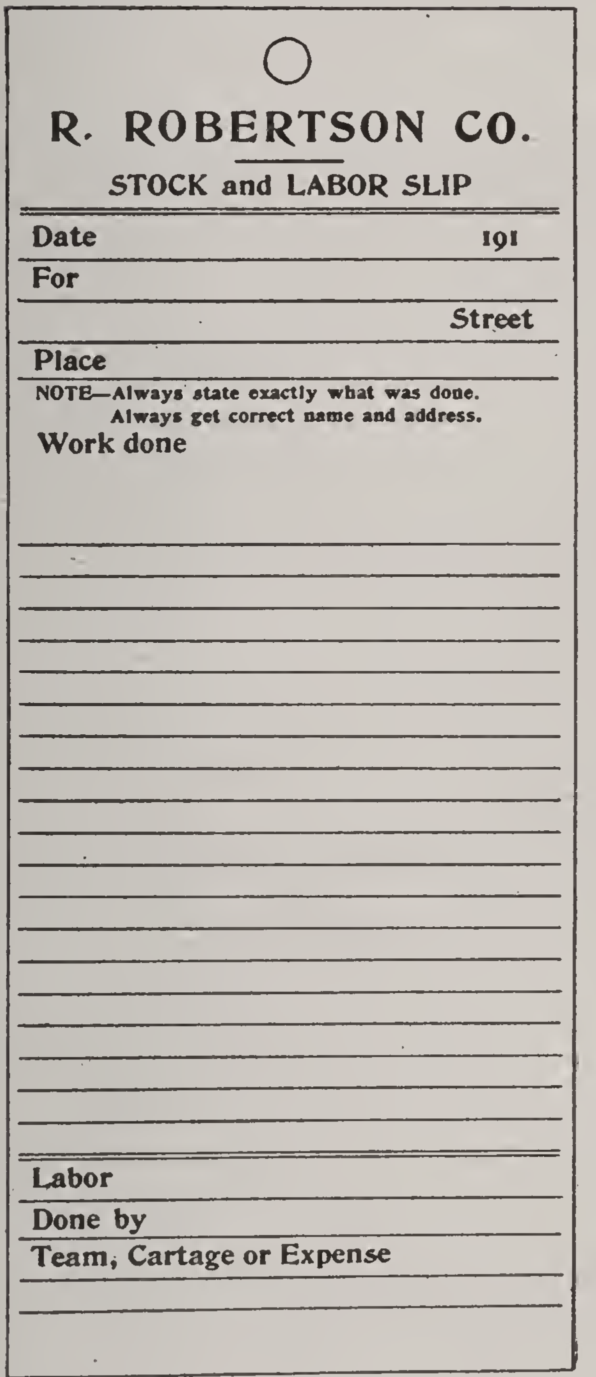
Description of work

Work done by

Date

Fig. 1—Order Slip Which Insures Prompt Attention and Prevents Errors in Charging

The master plumbers referred to are Robert Robertson, Beverly, president of the Massachusetts State Association of Master Plumbers, and James H. Trow, Salem, secretary of the North Shore Association, which comprises members in seven or eight towns to the northeast of Boston. The business of the Robert Robertson Co. is a large one, covering practically all branches of plumbing and heating and is carried on from four shops. That of James H. Trow is centered in Salem and its environs and covers plumbing and heating of the class common to



R. ROBERTSON CO.

STOCK and LABOR SLIP

Date 191

For

Street

Place

NOTE—Always state exactly what was done.
Always get correct name and address.

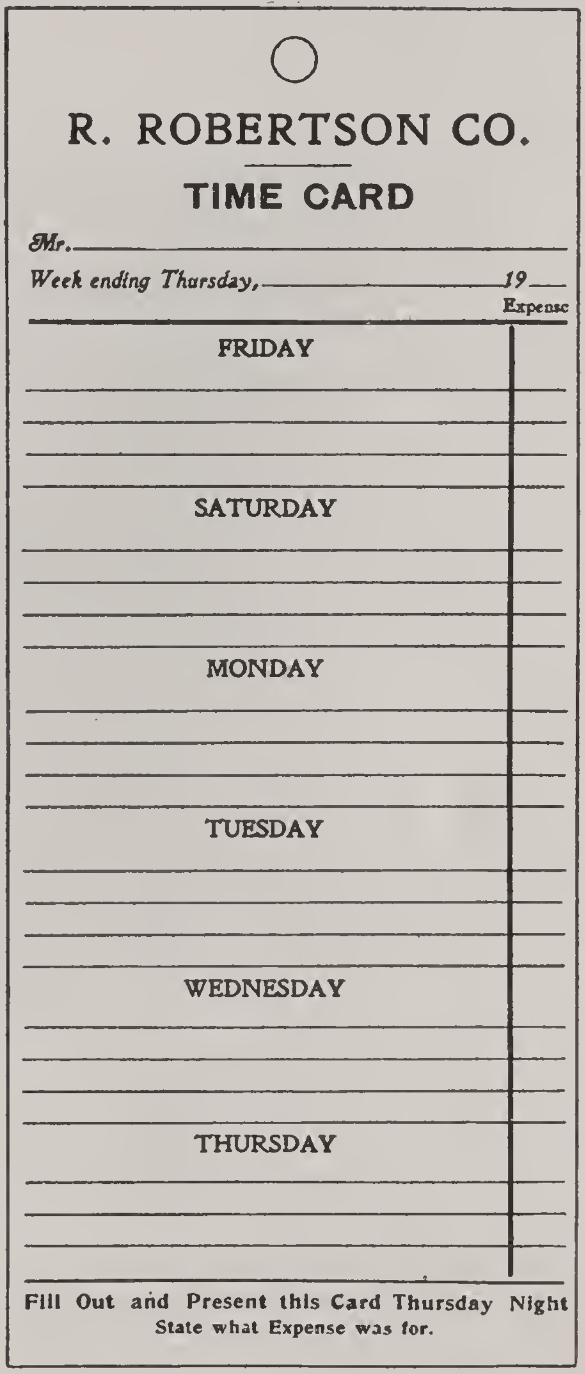
Work done

Labor

Done by

Team, Cartage or Expense

Fig. 2—Form Which Must be Used by Workmen in Making Charges. Weekly Time is Charged From This Slip



R. ROBERTSON CO.

TIME CARD

Mr.

Week ending Thursday, 19

Expense

FRIDAY

SATURDAY

MONDAY

TUESDAY

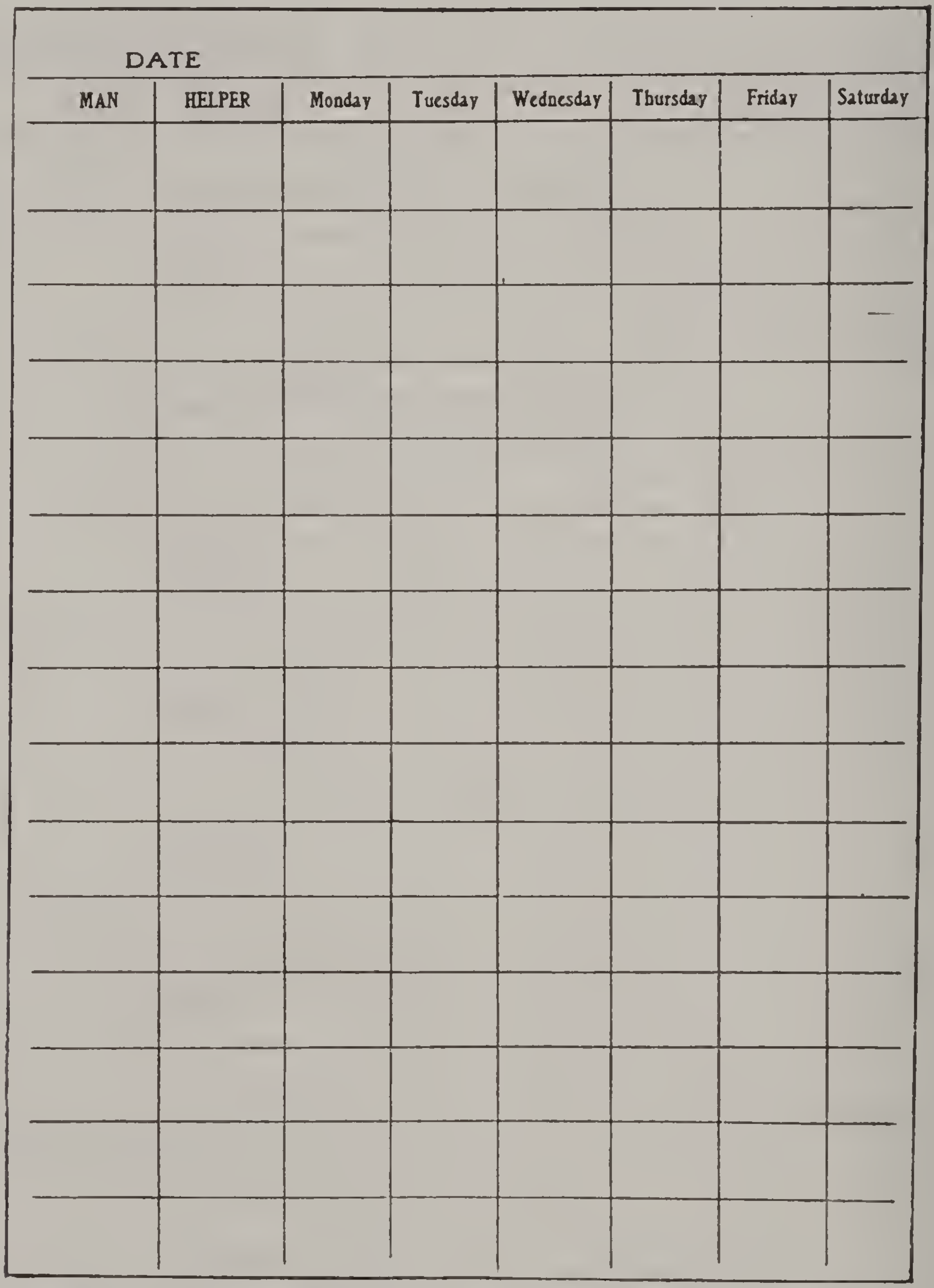
WEDNESDAY

THURSDAY

Fill Out and Present this Card Thursday Night
State what Expense was for.

Fig. 3—Weekly Time Card Kept by Men. This Must Tally With Time Charged on Stock and Labor Slips

towns of a manufacturing and residential nature. Therefore, these may be taken as representative shops and the information most willingly given for the benefit of readers of *Metal Worker, Plumber and Steam Fitter* as to the conduct of these successful businesses may be put to use by a very large majority of the plumbers of the country.



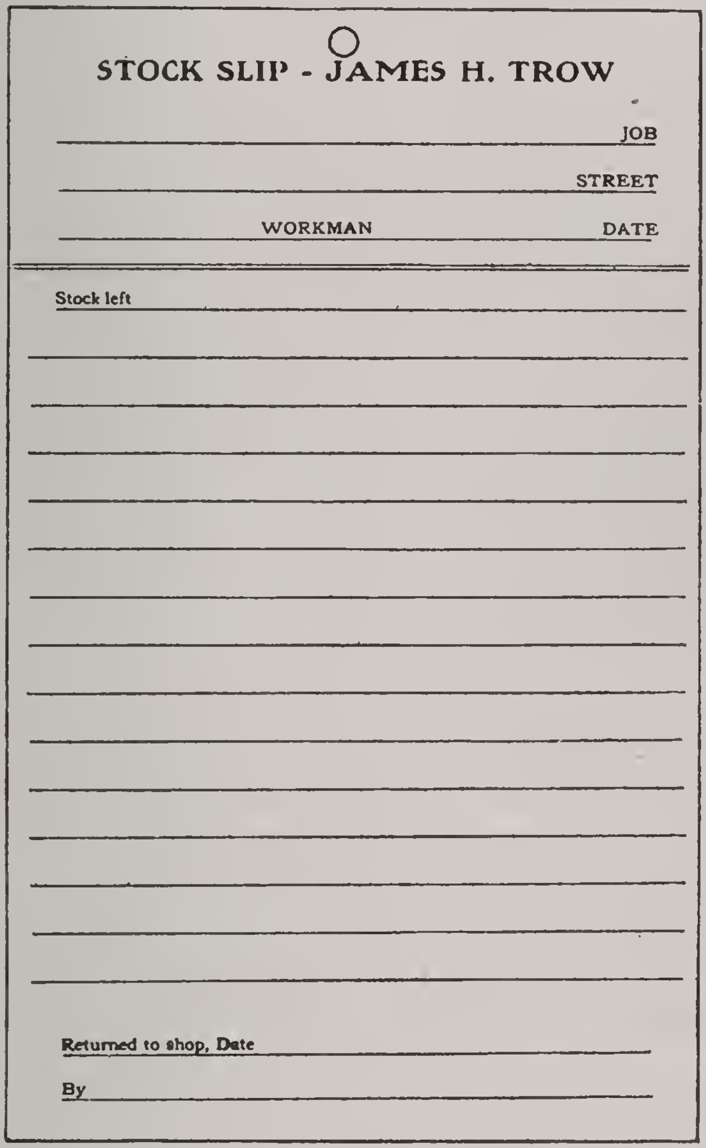
DATE

MAN	HELPER	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Fig. 4—Convenient Office Time Card Used by Bookkeeper in Checking Time of Plumbers and Helpers as Charged on Daily and Weekly Forms, Handy for Making up Pay-Roll

KEEPING A CHECK ON PURCHASES

The logical commencement of any business is the purchase of stock. If this is purchased in a haphazard manner it may only be a short time until capital is tied up to a serious extent and the selection will be ill balanced. This is prevented by the use of proper order books. No matter whether the order is given by mail, by telephone or to a traveling man, it should be passed through this book and a carbon copy retained. This is a simple safeguard which is apparent to all.



STOCK SLIP - JAMES H. TROW

JOB

STREET

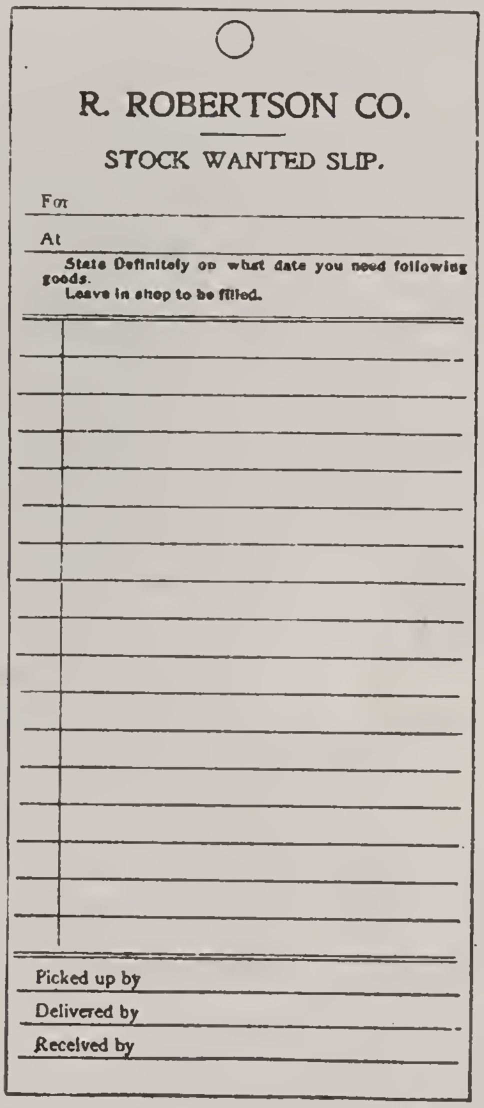
WORKMAN DATE

Stock left

Returned to shop, Date

By

Fig. 8—Forms Used by Workmen to Note Stock Left on Completion of Work. Handy as Credit Slip and a Check on Teamsters



R. ROBERTSON CO.

STOCK WANTED SLIP.

For

At

State Definitely on what date you need following goods.
Leave in shop to be filled.

Picked up by

Delivered by

Received by

Fig. 5—Order for Material to be Used on a Job

The efficacy of the system depends upon the care with which the system is adhered to. Let it be known to the supply men that such order forms are required and that order numbers are to be quoted on invoices and the system will show results. It first of all is a check upon unscrupulous dealers. The order cannot be padded and the invoice must compare with the carbon copy of the order. By referring periodically to the carbons it may be ascertained what amount of stock is being carried or what may have been allowed to escape in charging to some job in hand.

LOCAL ORDER BOOKS FOR PURCHASES FROM FELLOW TRADESMEN

Such books are in use by the Robertson Co., and their use is a matter of course at all of the branches. In addition another book is in use. This is a local order book and is used by all of the plumbers in Beverly. When any one of them is short on some supplies and wishes to call upon some of his fellow tradesmen for enough to carry him over for the time being, he issues the order through his local order book. Promptly at the end of each month bills for such supplies must be paid and an arrangement is in force whereby the charge made is the net cost of the article plus a small uniform overhead charge. The rule is strictly adhered to by all of the shops and therefore there is not hesitancy about asking for supplies when required.

KEEPING A CHECK ON STOCK

In both of the shops mentioned a careful check is kept on the amount of stock in hand but in one case the work is in charge of a workman as a part of his duties and in the other it is directly looked after by the proprietor. Neither firm finds it necessary to have any automatic method of recording the quantities carried but as soon as these fall below the minimum amount set, a note is made and filed at the desk and such quantities as may be necessary are ordered through the books previously mentioned.

ACCURACY IN TAKING CUSTOMERS' ORDERS

In taking orders for work in jobbing lines the form shown in Fig. 1 is used by James H. Trow. This is filled out by the clerk according to the customer's instructions and is filed. Then the order is added to a daily card on the proprietor's desk, which is checked up nightly as the workmen's time cards come in. Such orders as have not been overtaken or completed are carried forward to the next day's card. It will be noticed that a line is left for the name of the workman to whom the order is handed and therefore a check is available on each man's time.

For a similar class of work the slip shown in Fig. 2 is used by the Robertson Company. Both the labor and amount of stock used are noted on this slip and there is also space for the notation of any incidental expense incurred by the workman.

These slips are filed and carefully checked up from the workman's weekly time slips. Any discrepancy in the amount of time worked and charged in the two forms is at once apparent and it can be seen readily if any job has been wrongly charged or omitted. The girl, whose duties cover the charging of stock and labor, has a second check on these slips in the form of an office time sheet for each employee. His total time is entered in these sheets, which are shown in Figs. 3 and 4, and as he is paid according to the time entered therein, any failure to charge time correctly is brought to his attention at once and the matter is likely to be rectified without delay.

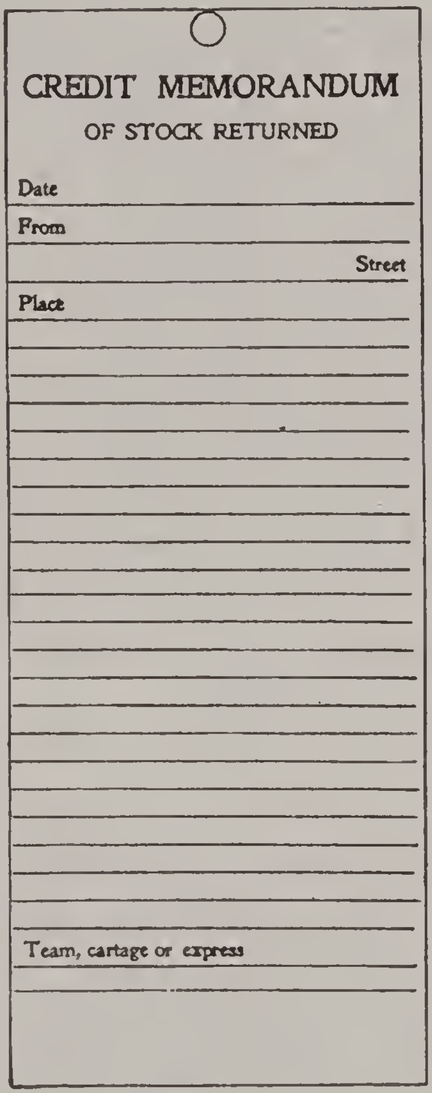
CHARGES ON EXTENSIVE JOBS

On contract work and jobs which take longer than one day to execute, requisition and credit slips are used, as shown in Figs. 5 and 6. By the aid of these an accurate record of the stock taken out and returned is kept and the persons responsible for its delivery to the job and return to the shop are noted through their being required to sign for its receipt.

In this connection another slip shown in Fig. 7 is also of interest. This is a form used at the shop or on a job should materials be delivered direct. It shows the amount of material received from carriers and where it came from. This is used to check up invoices and orders. It is known at the end of each day what orders are being held up and also what errors have been made in invoicing or in filling the order. This is an important part of the system and is recommended for use in any shop, no matter how small.

KEEPING CHECK ON THE TEAMSTER

Another form which is calculated to keep a check on stock left over on jobs is used by Mr. Trow. This is shown in Fig. 8. It is turned in by the workman on the completion of a job or a part of a job. He makes a note of the amount of material there is left over and as soon as the teamster is at liberty to bring in the material the slip is turned over to him and he is responsible for its delivery in full to the shop.

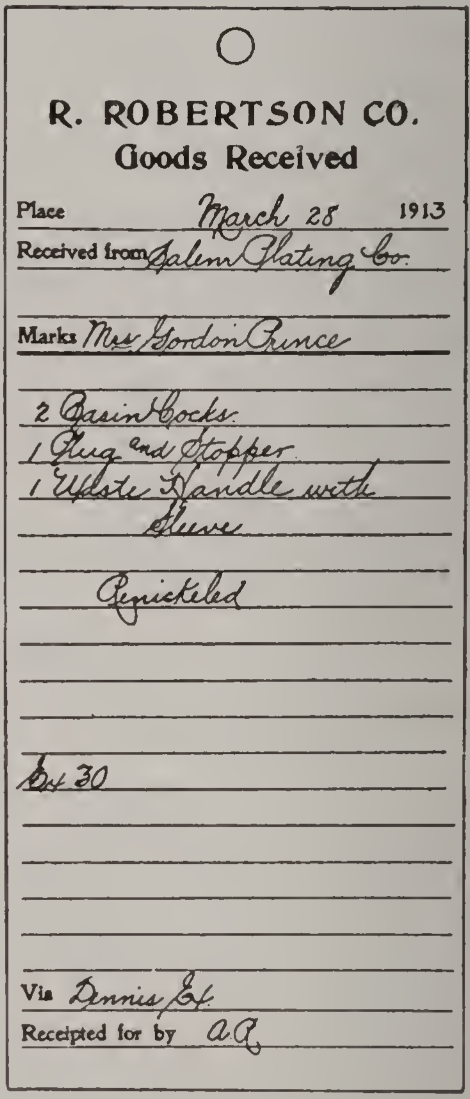


CREDIT MEMORANDUM
OF STOCK RETURNED

Date
From
Street
Place

Team, cartage or express

Fig. 6



R. ROBERTSON CO.
Goods Received

Place March 28 1913
Received from Salem Plating Co.

Marks Mrs Gordon Prince

2 Basin Cocks.
1 Plug and Stopper.
1 Waste Handle with
Sleeve

Renickeled

Ex 30

Via Dennis Ex.
Receipted for by A.R.

Fig. 7

Forms Used in Keeping a Check on Materials Delivered to Jobs From Shop and Supply Houses

Both firms use modern methods of bookkeeping as well as modern methods of executing the work. Loose leaf books are in use by the Robertson Company which afford an accurate check on accounts of one item or of one hundred.

TIME SAVING IDEA IN BOOKKEEPING

A time saving idea is shown in Fig. 9. This is a system of bookkeeping in which the charge is made direct from the stock and labor charge slips. A carbon copy is made of each entry and the result is that the bill is ready for the customer at any time it is called for and it is always up to date. The system is equally as satisfactory on extensive jobs as on small repair work and is a convenient and satisfactory system where the clerical force is small.

Very few country plumbers have the courage to employ three bookkeepers and to equip their office with adding machines and modern appliances to facilitate the work in the office. While the circumstances are exceptional in the case of the Robertson Company, in view of the number of branch shops maintained, it has been found necessary to employ three girls constantly. Mr. Robertson, in commenting on the matter of close supervision of every detail remarked incidentally that a saving of over $300 resulted during the first year the third assistant was employed, solely due to the closer scrutiny of invoices and discounts made possible by the increased staff. This is only one instance where proof of the value of the policy of letting the minor employee take care of minor details has been afforded.

SAFEGUARDS FOR "EXTRAS" ON CONTRACTS

Avoidance of dispute on the presentation of a bill at the completion of a contract is made by the use of such forms as that shown in Fig. 10. These are carried by the man in charge of contract work and when a change is ordered by the architect or owner he is asked to specify the work on the form and his signature is affixed as a matter of course. The system is a protection to the customer as much as to the contractor and is appreciated accordingly.

The form shown in Fig. 11 is one that all shops could not use to advantage but which is particularly useful in towns such as Beverly. There many of the houses are occupied only in the summer and a large part of the work in spring and fall consists of preparing the houses for occupancy and in closing them again at the end of the season so that there will be no damage from frost resulting. As may be expected there is a considerable wear and tear on a plumbing system in such a house and therefore the men entrusted with the work are instructed to examine every part carefully and to make a report to the office as to the condition of things. The slip shows just what he finds and a copy is sent to the customer drawing his attention to any repairs that may be required. Responsibility is thereby taken from the plumber and a fair amount of work results from the practice as well.

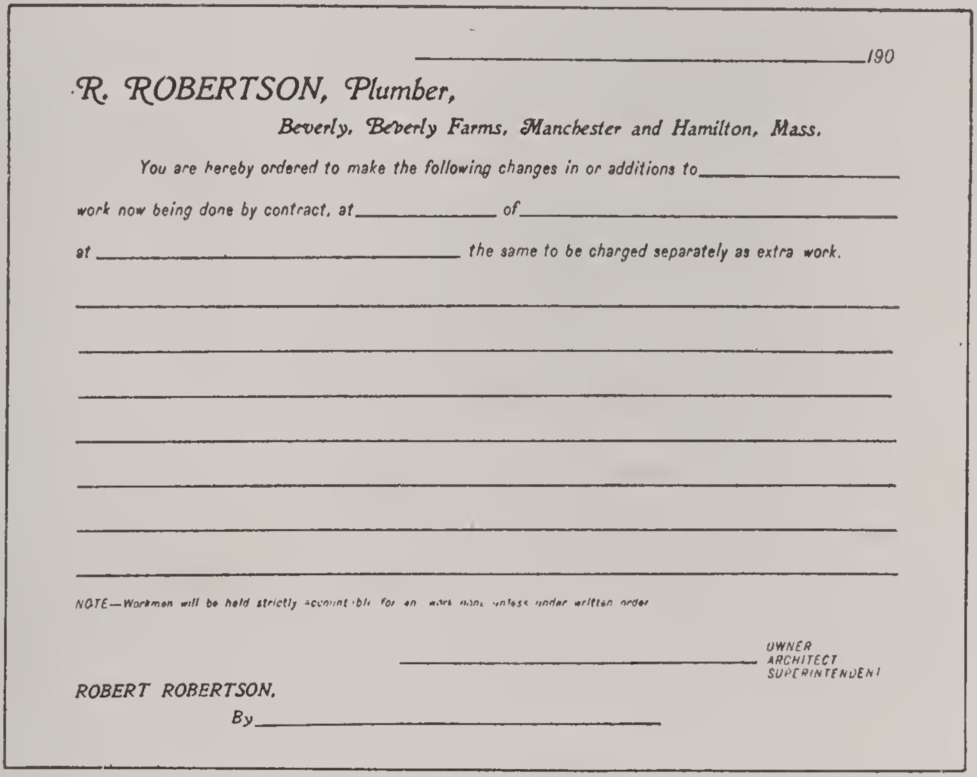
A HANDY TELEPHONE AUXILIARY

The slip shown in Fig. 12 is one that may be used in any office but it shows how carefully business is followed up by Mr. Trow. These slips are placed conveniently to the telephone and every order or request is carefully taken, for it is expected that the slip will be filled for the attention of Mr. Trow on his return to the office. It prevents slipshod order-taking by the employees and secures a more effective service to the customer who telephones his order.

A FEW ESTIMATING HINTS

As may be expected from firms which are so careful in the conduct of business equal care is taken in estimating. Both have special forms of estimate blanks which have been developed as the result of their experience. In the case of the Robertson Company the firm does a large business in installing water supply plants and it has a special form for this class of work alone. It includes spaces for every part or supply that may be needed and for all the special expenses on such work. In heating the same applies, and the sheet is printed on both sides. On one side is the estimate blank including all the material and supplies required, spaces for labor charges, and all incidental expenses.

On the other side is the data sheet. This is ruled so that columns are provided for the data on all of the rooms in a building, proportion of boilers and other particulars which must be ascertained before the estimate can be made. When these figures have been compiled the amounts are carried to the other side and the quantities that will be necessary are ascertained from the plans or previous measurements. Then the sheet is filed so that all particulars are available with the minimum of trouble.



______________________ 190

R. ROBERTSON, Plumber,

Beverly, Beverly Farms, Manchester and Hamilton, Mass.

You are hereby ordered to make the following changes in or additions to ______________

work now being done by contract, at ______________ of ______________

at ______________ the same to be charged separately as extra work.

____

____

____

____

____

____

____

NOTE—Workmen will be held strictly accountable for any work done unless under written order

______________________ *OWNER*
ARCHITECT
SUPERINTENDENT

ROBERT ROBERTSON,
By ______________________

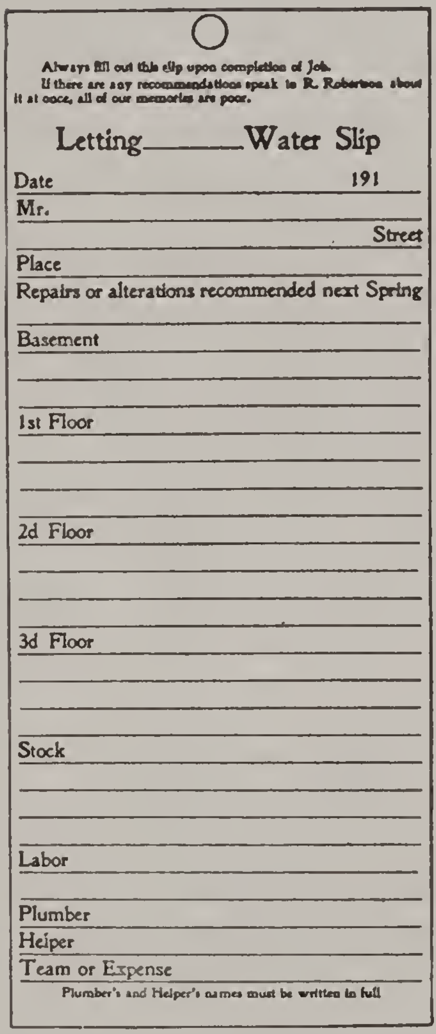
Fig. 10—Customers Order Slip. Guarantee Against Disputes on "Extras"

The estimate blank for plumbing work is laid out so that the roughing and finishing work will be readily separated. This makes it easier to compute the labor charges as well as to keep track of the material to be ordered as the work progresses.

A CONVENIENT FILING SYSTEM

It is interesting to note that a vertical system of filing is employed and that one compartment of the file is set aside for each job in progress. Everything pertaining to that job is placed in that file so that it may contain a complete record from the first correspondence concerning it, letters asking for information on prices of special material, estimate sheets and copy of bid, acceptance of the bid and all correspondence relating to the work.

Thus when any question arises the material is at hand immediately, and the filing system is reduced to its simplest form. Should it be necessary to refer to any correspondence concerning a certain job in the proprietor's absence the office staff has no difficulty in locating the correspondence or other papers, and time and trouble are thereby saved.



Always fill out this slip upon completion of Job.

If there are any recommendations speak to R. Robertson about it at once, all of our memories are poor.

Letting________Water Slip

Date 191

Mr.

Street

Place

Repairs or alterations recommended next Spring

Basement

1st Floor

2d Floor

3d Floor

Stock

Labor

Plumber

Helper

Team or Expense

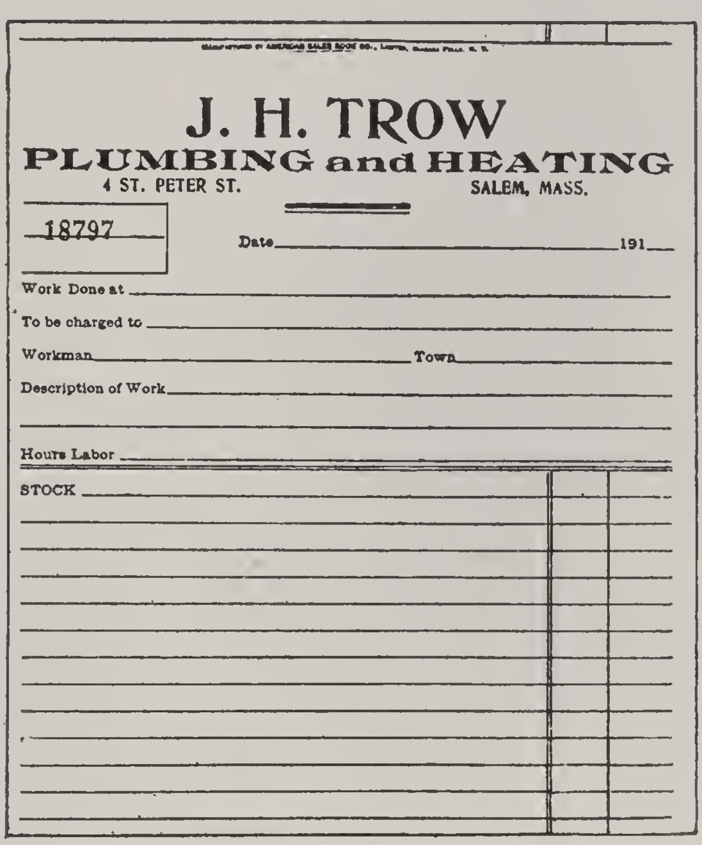
Plumber's and Helper's names must be written in full

Fig. 11—Notification of Work Required to Keep Fixtures in Good Condition

AIDS TO COST KEEPING

In the matter of cost keeping Mr. Robertson is very exact. As the system of charging and keeping account of all invoices of material is most complete it is an easy matter to ascertain the exact cost on any contract. Then if there is any discrepancy it is at once inquired into and the reason ascertained. If the work has been executed much more quickly than was anticipated it is also known and the conditions which made this possible are noted.

One of the most valuable aids to the business head is a small card cabinet in which are filed cards containing estimated and realized costs of all jobs as they are completed. The time of the year when they were executed, the distance from the shop, the cost of each section of the job, and other particulars are given on these cards. The aid to correct estimating which these afford is obvious. Should an estimate be desired on any building the approximate labor cost per fixture can be ascertained directly by reference to the cards of previous jobs in the same locality and which were executed at about the same season as the one to be estimated. Then these costs may be readily used to check the new estimate.



J. H. TROW
PLUMBING and HEATING
4 ST. PETER ST. SALEM, MASS.

18797

Date ____________ 191__

Work Done at ____________

To be charged to ____________

Workman ____________ Town ____________

Description of Work ____________

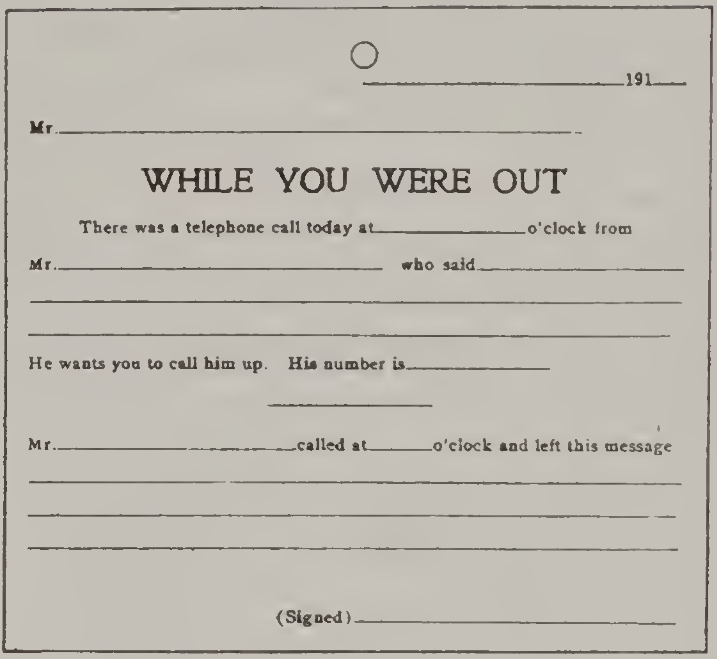
Hours Labor ____________

STOCK ____________

Fig. 9—An Automatic Form Invoice and Day Book, Carbon Copy Makes Bill as Entry is Made on First Page

The estimate sheets for plumbing and heating used by Mr. Trow were developed by him chiefly for the benefit of his fellow members in the North Shore Association of Master Plumbers. The discrepancy in bids before these were adopted by the plumbers in the association was in most cases very marked. As may be seen by reference to the reproduction of the sheet in Fig. 13 there is little reason for discrepancies now as every item is considered and would hardly be overlooked by anyone in preparing an estimate.

It may be said here that the estimate sheet illustrated is one which was submitted to the members of the North Shore Association for trial purposes, and it is the intention to make any changes on it which the experience of the members may show to be advisable. The difficulty of preparing a sheet which would suit the individual requirements or preferences of all members was fully appreciated and their suggestions after a fair trial will be considered and incorporated in the sheet finally adopted.



○

________________191____

Mr.________________________________

WHILE YOU WERE OUT

There was a telephone call today at____________o'clock from

Mr.________________________ who said________________

He wants you to call him up. His number is____________

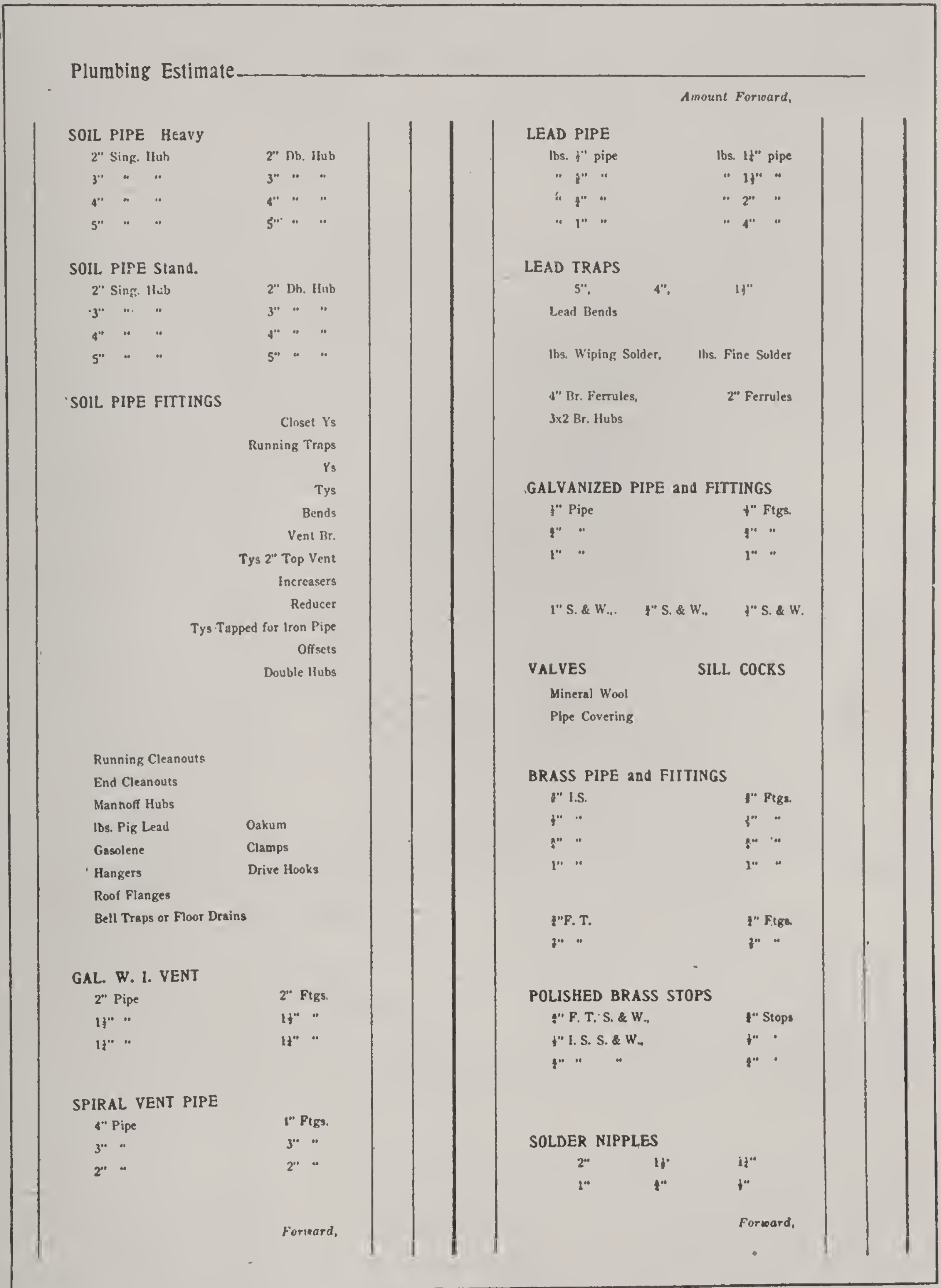
Mr.____________________called at________o'clock and left this message

(Signed)________________________

Fig. 12—Convenient Telephone Call Reminder

After all is said and done regarding business systems the personal equation must have full consideration. If the proprietor of a business does not insist upon strict following of the system it will be ineffective, no matter how carefully it is designed. Every part of it to be effective, must be a check upon the other and therefore if any part of it is omitted or carelessly followed the whole system is upset.

It is in this respect that the executive ability of the employer must be exerted. He must be able to teach his men the full importance of observing his rules and that it is not merely a system of red tape and a laborious duty that is put upon them. If the employee is intelligent he will soon appreciate the worth of a careful accounting of time and stock and his efficiency will be increased by that



Plumbing Estimate

Amount Forward,

SOIL PIPE Heavy
2" Sing. Hub — 2" Db. Hub
3" " " — 3" " "
4" " " — 4" " "
5" " " — 5" " "

SOIL PIPE Stand.
2" Sing. Hub — 2" Db. Hub
3" " " — 3" " "
4" " " — 4" " "
5" " " — 5" " "

SOIL PIPE FITTINGS
Closet Ys
Running Traps
Ys
Tys
Bends
Vent Br.
Tys 2" Top Vent
Increasers
Reducer
Tys Tapped for Iron Pipe
Offsets
Double Hubs

Running Cleanouts
End Cleanouts
Manhoff Hubs
lbs. Pig Lead — Oakum
Gasolene — Clamps
Hangers — Drive Hooks
Roof Flanges
Bell Traps or Floor Drains

GAL. W. I. VENT
2" Pipe — 2" Ftgs.
1½" " — 1½" "
1¼" " — 1¼" "

SPIRAL VENT PIPE
4" Pipe — 4" Ftgs.
3" " — 3" "
2" " — 2" "

Forward,

LEAD PIPE
lbs. ½" pipe — lbs. 1¼" pipe
" ⅝" " — " 1½" "
" ¾" " — " 2" "
" 1" " — " 4" "

LEAD TRAPS
5", 4", 1½"
Lead Bends

lbs. Wiping Solder, lbs. Fine Solder

4" Br. Ferrules, 2" Ferrules
3x2 Br. Hubs

GALVANIZED PIPE and FITTINGS
½" Pipe — ½" Ftgs.
¾" " — ¾" "
1" " — 1" "

1" S. & W., ¾" S. & W., ½" S. & W.

VALVES — SILL COCKS
Mineral Wool
Pipe Covering

BRASS PIPE and FITTINGS
⅜" I.S. — ⅜" Ftgs.
½" " — ½" "
¾" " — ¾" "
1" " — 1" "

⅜"F. T. — ⅜" Ftgs.
½" " — ½" "

POLISHED BRASS STOPS
⅜" F. T. S. & W., — ⅜" Stops
½" I. S. S. & W., — ½" "
⅜" " " — ⅜" "

SOLDER NIPPLES
2" 1½" 1¼"
1" ¾" ½"

Forward,

Fig. 13—An Estimate Sheet Evolved by a Master Plumbers' Association

much at least. But the judgment of the employer must be exercised in designing the system to fit the business. The simpler the system can be made the more efficient is it likely to be. The chief and imperative requirement is that it will be self checking and that an error in any part will be shown automatically.

ESTIMATE BLANK FOR PLUMBING WORK

Form Compiled by National Association of Master Plumbers for Its Members

A VALUABLE assistance to its members was rendered at the meeting of the National Association of Master Plumbers in Philadelphia last week by a special committee which offered with its report an estimate blank for plumbers. This blank was compiled by a sub-committee of the joint committee from the plumbers' and steam fitters' national organizations and is reproduced in the accompanying illustration.

This blank, as will be noted, is so drawn up that it may be used on any plumbing job, be it large or small. The different items are arranged in a logical fashion or in divisions. In compiling the blank the members of the committee aimed to list all the fittings so that a contractor in making up an estimate will not overlook any item or items.

In addition to a space for the cost of all fittings and labor, there are spaces in which the incidental expenses, overhead expense and profit may be set down.

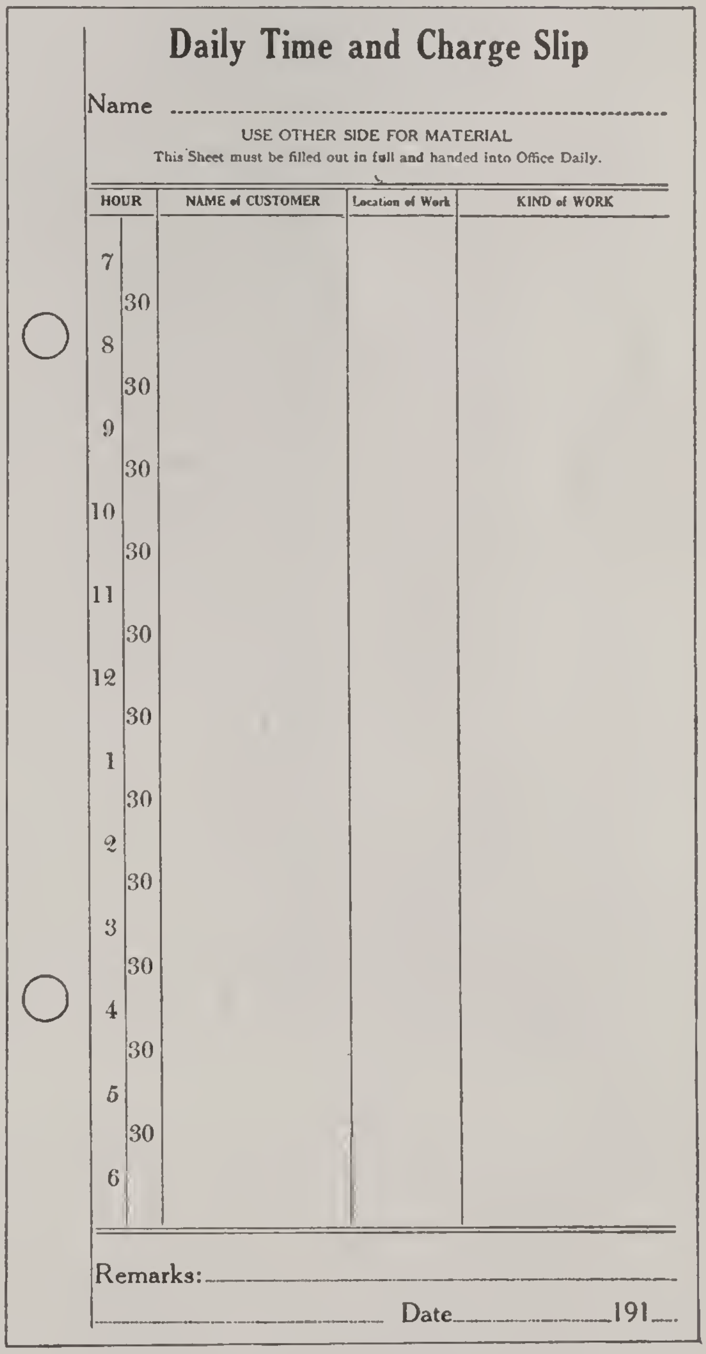
The blank proper is 15 x 20 inches and is intended to be folded up for filing. There are notation and filing spaces on the back to be filled in so that when filed away it will be unnecessary to unfold the form to identify the estimate.

It will be seen that the estimate form begins at the sewer and water connections to the mains and that it progresses through the roughing to the completion of the contract in a logical manner. The advantage of a form like this to the practical man who is conversant with the details of construction and can follow them in imagination as he takes off the quantities is apparent. It saves much needless turning from point to point with consequent chance of missing some item of importance. The provision for fire and vacuum lines makes it useful for larger city work also and profit and overhead expense are also included.

KEEPING PLUMBING COSTS WITH FOUR BLANKS

Efficient and Simplified Cost Keeping Methods as Followed by a Prominent Plumbing Company of Toledo

A COST-KEEPING system for a plumbing shop, as used by the Larsen & Wood Co., Toledo, Ohio, furnishes a complete record without being intricate and with the use of few data sheets. This system of cost-keeping has been worked out by the company to meet the needs of a plumbing contractor and is regarded as efficient.



Daily Time and Charge Slip

Name ....

USE OTHER SIDE FOR MATERIAL

This Sheet must be filled out in full and handed into Office Daily.

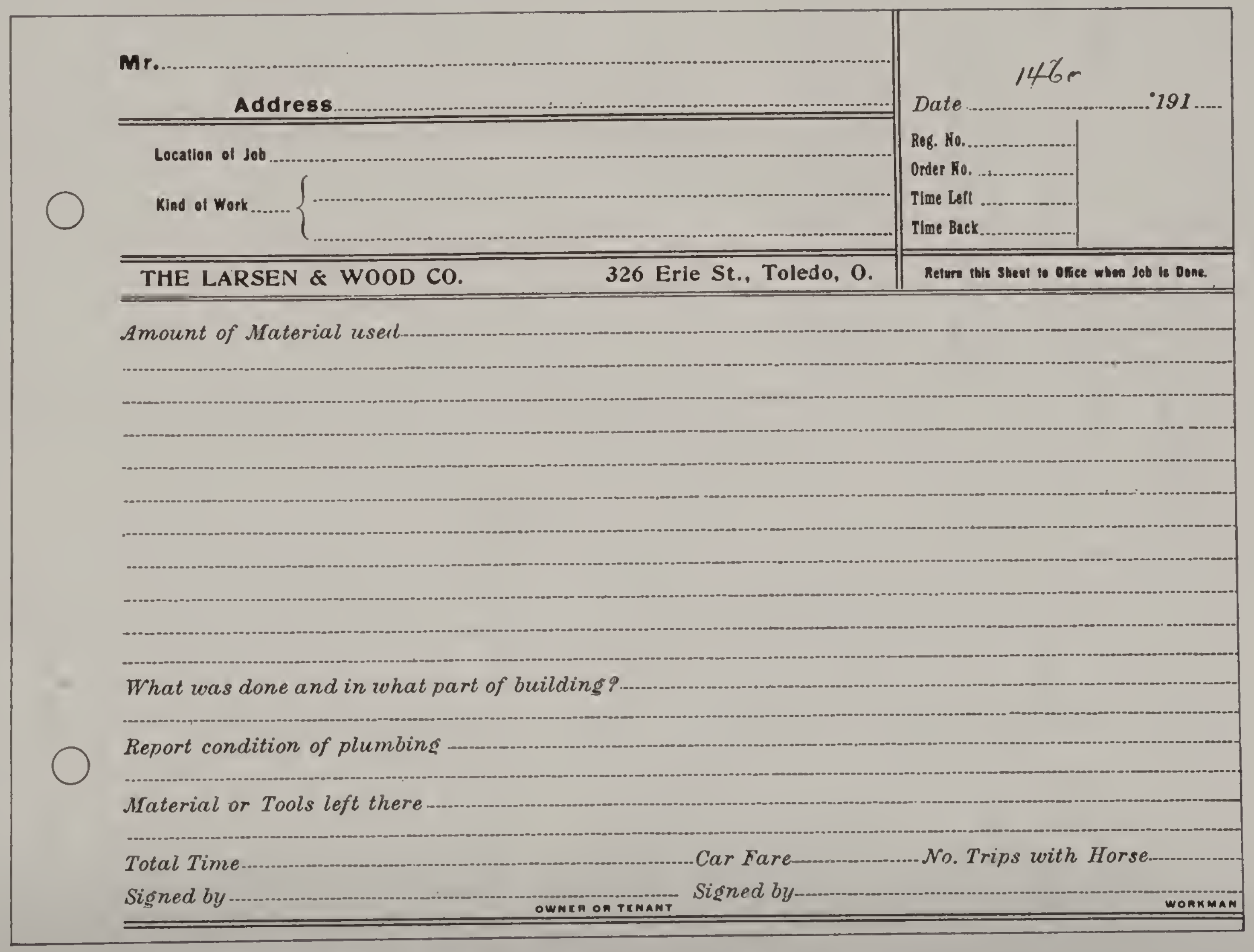
HOUR		NAME of CUSTOMER	Location of Work	KIND of WORK
7				
	30			
8				
	30			
9				
	30			
10				
	30			
11				
	30			
12				
	30			
1				
	30			
2				
	30			
3				
	30			
4				
	30			
5				
	30			
6				

Remarks: ____________________

____________________ Date__________191__

Workman's Daily Time Card

All material ordered for a job is entered on a cost or jobbing sheet. In the first column of the ruled sheet, under the heading "Ordered In," is listed material ordered from a jobber for the particular job. In the next column, under "Debits," entries are made of material taken from stock. The next column provides space for noting the amount left over and credited back to stock when the job is complete. After deducting the unused



Mr.

Address

Location of Job

Kind of Work

146r

Date '191

Reg. No.

Order No.

Time Left

Time Back

THE LARSEN & WOOD CO. 326 Erie St., Toledo, O.

Return this Sheet to Office when Job is Done.

Amount of Material used

What was done and in what part of building?

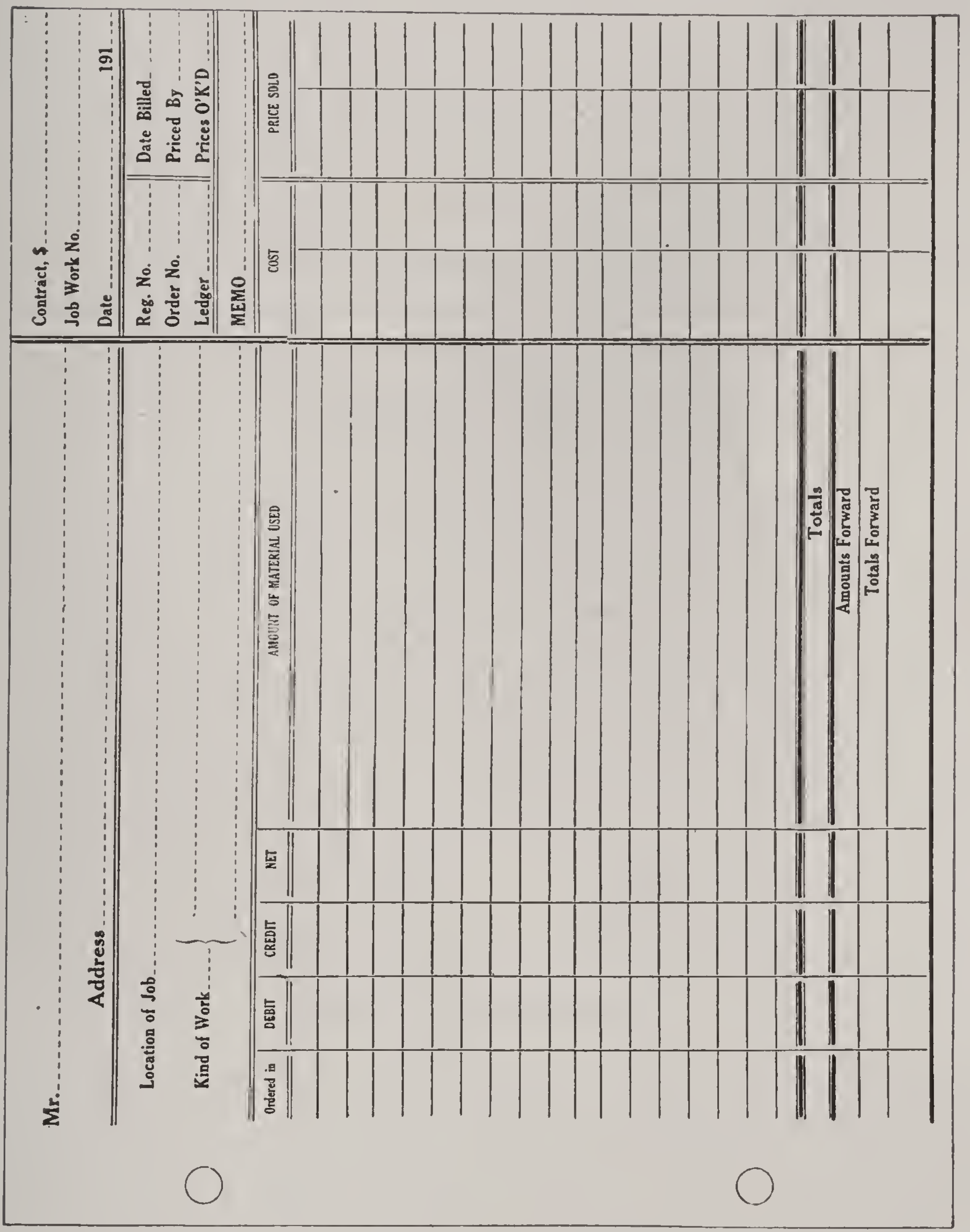
Report condition of plumbing

Material or Tools left there

Total Time *Car Fare* *No. Trips with Horse*

Signed by OWNER OR TENANT *Signed by* WORKMAN

Jobbing and Cost Sheet Used by Larson and Wood Co.



Mr.

Address

Location of Job

Kind of Work

Contract, $

Job Work No.

Date 191

Reg. No.

Order No.

Ledger

Date Billed

Priced By

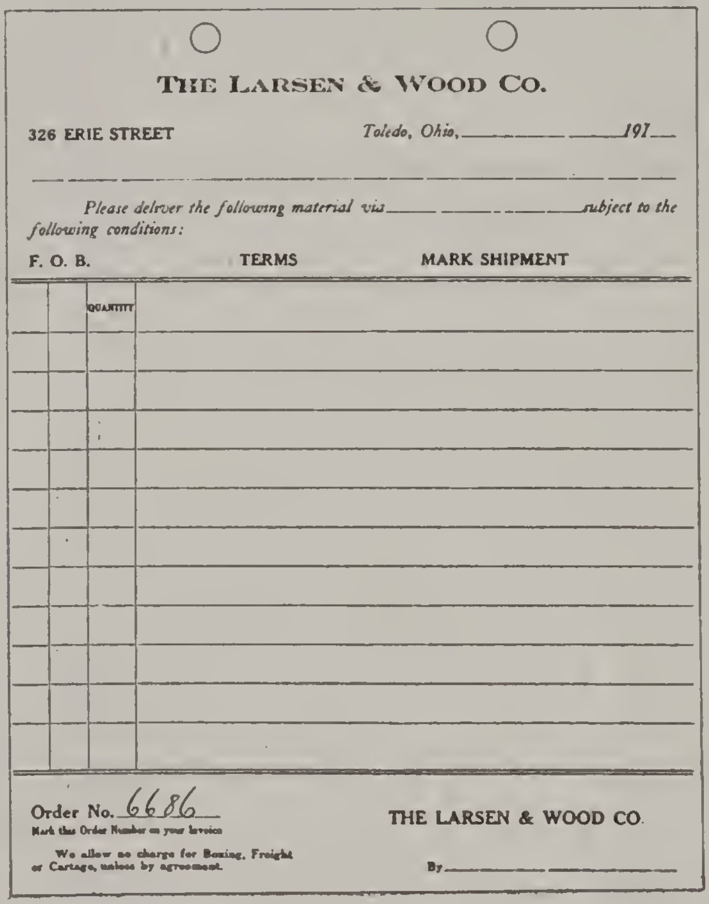
Prices O'K'D

MEMO

Ordered in	DEBIT	CREDIT	NET	AMOUNT OF MATERIAL USED	COST	PRICE SOLD
				Totals		
				Amounts Forward		
				Totals Forward		

Partial Duplicate of Cost and Jobbing Sheet for Workmen material, the quantity of material actually used is placed in the next column under the heading "Net." The next space is for recording the kind of material, and to the right are columns for the cost and price charge of the owner, location of the job, date, order number, etc.

A carbon copy of this jobbing sheet is taken on a slightly different blank and this copy is taken on the job by the workman, who returns it to the office when the job is completed, after filling it out with the time spent.



THE LARSEN & WOOD CO.

326 ERIE STREET

Toledo, Ohio, __________ *191*__

Please deliver the following material via __________ *subject to the following conditions:*

F. O. B. TERMS MARK SHIPMENT

QUANTITY

Order No. 6686

Mark this Order Number on your Invoice

We allow no charge for Boxing, Freight or Cartage, unless by agreement.

THE LARSEN & WOOD CO.

By __________

Order Form for Materials

The total cost and charge for the job are footed up at the bottom of the jobbing sheet and carried forward from the first day of the month so that a record is provided at the end of the month of the total amount of work done or sales made during the month. All shop records of a job are kept in a folder by themselves until the job is completed. The jobbing sheets are bound in loose leaf binders in monthly packages and filed away for convenient reference.

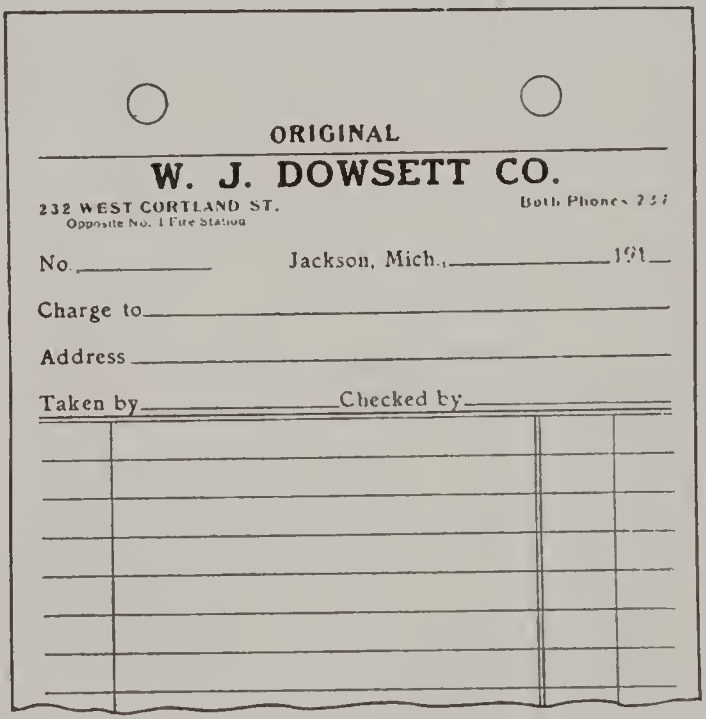
The workman's time is kept on a daily time and charge card, one of which is furnished each man daily, and must be filled out at the end of each day's work. This card is so arranged that the workman records his time by checking off the time he went on a job and the time he quit. If he works on more than one job the same day he can keep the record on the same card. Space is provided on this same card for notation as to the location of the work and the kind of work. Material used is noted on the back of the card. These cards are filed away by weeks.

The only other blank used is an order sheet that is filled out in duplicate for ordering material from the jobber. This as may be noted indicates the terms under which the goods are to be delivered.

SIMPLIFIED COST SYSTEM FOR PLUMBING SHOPS

Cost Accounting Method as Worked Out by a Plumber of Nineteen Years' Experience

A COST system based on 19 years' practical experience in the plumbing business is in operation in the office of the W. J. Dowsett Co., Jackson, Mich. This system also embraces the placing of stock on hand and a record of its disposition. All plumbing and heating contracts are properly filed and records are kept showing current prices of materials. This latter feature is kept up-to-date, and at the arrival of each shipment of material the price is entered on the cards for future reference. In each drawer there are special compartments allotted to all fittings, such as nipples, elbows and tees. White cards are used for galvanized fittings and blue cards for cast-iron fittings.



ORIGINAL

W. J. DOWSETT CO.

232 WEST CORTLAND ST.
Opposite No. 1 Fire Station

Both Phones 257

No. ______ Jackson, Mich., ______ 191__

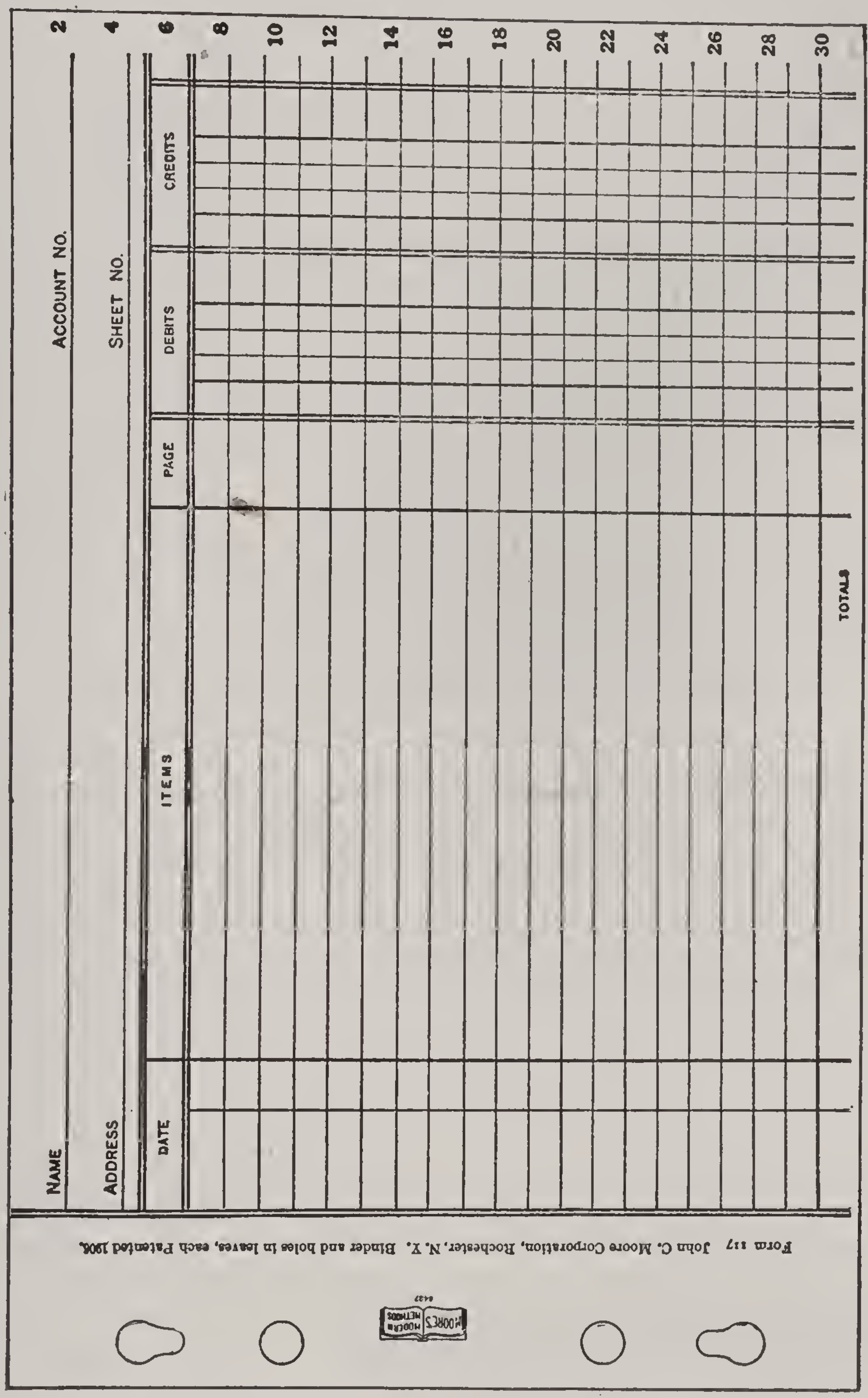
Charge to ______

Address ______

Taken by ______ Checked by ______

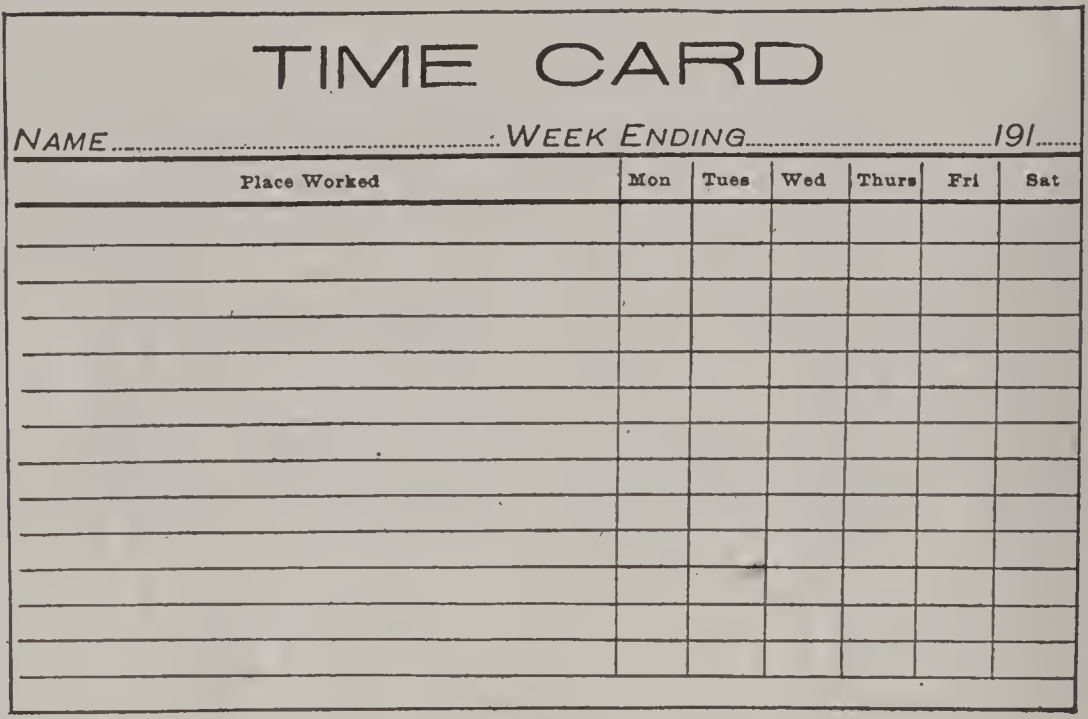
Charge Slip Used by Workmen

There is an index card in front of each compartment denoting what fittings are priced, and as they are arranged starting from the smallest size up, it is quite easy to find out the cost price of any particular fitting. In figuring contracts Mr. Dowsett has found this indispensable, and, up-to-date as it is, this is probably responsible for securing the large volume of the work that he undertakes.


NAME
ACCOUNT NO.
ADDRESS
SHEET NO.
DATE
ITEMS
PAGE
DEBITS
CREDITS
TOTALS
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Form 117 John C. Moore Corporation, Rochester, N. Y. Binder and holes in leaves, each Patented 1906.
MOORE'S MODERN METHODS

Final Cost Sheet from which Invoices are Prepared

The slips used in the keeping of costs are few in number. Every material sheet is numbered and has to be accounted for. When materials are taken out to a job the list is entered on a slip as shown in the accompanying illustration. The name of the job is filled in, the address, the name of the workmen taking them, and the name of the storekeeper or whoever sees the goods taken out. This is then turned over to the bookkeeper in order that she may charge the job with that amount of material. When goods are returned the same procedure is followed,

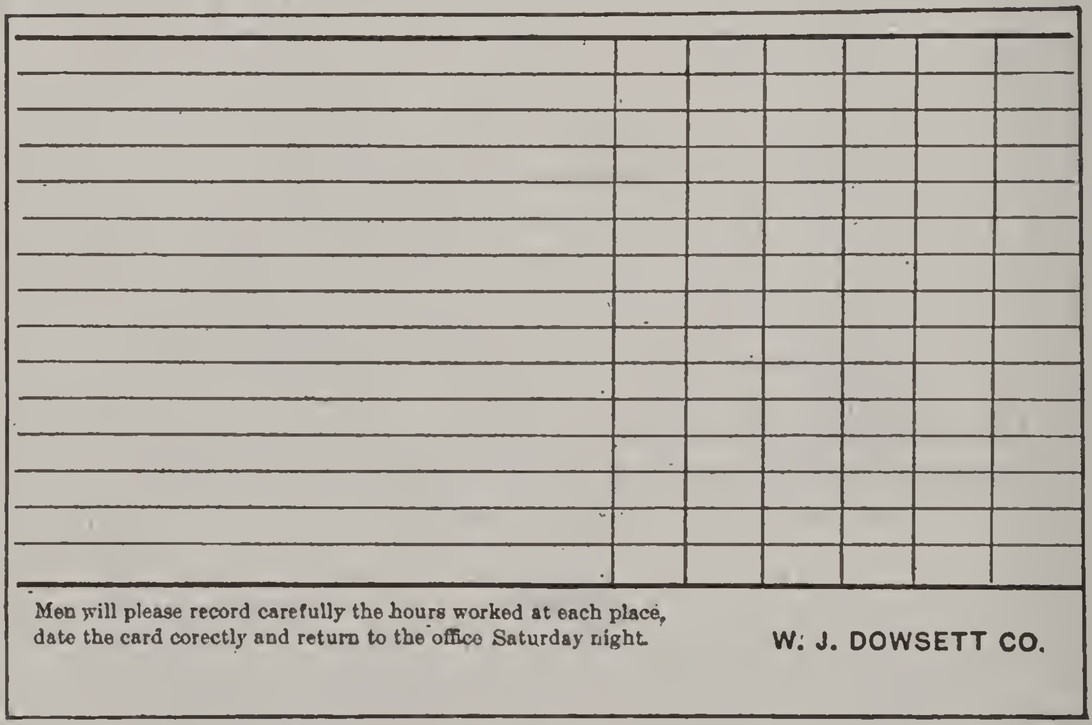


TIME CARD

NAME.......................................WEEK ENDING..............................191......

Place Worked	Mon	Tues	Wed	Thurs	Fri	Sat

Time Card Showing Hours Worked for Week



Men will please record carefully the hours worked at each place, date the card corectly and return to the office Saturday night.

W. J. DOWSETT CO.

Reverse of Time Card

but the word "Charge" is crossed out on the slip and credit inserted. This is the workman's duty and it is up to the stockkeeper to see that it is carried out. These slips are then looked over by the master plumber himself and he, being acquainted with the details of the jobs, has a fair idea as to whether any material taken to the jobs has been omitted from the charge sheets. He has found, however, that accuracy is maintained on account of the simplicity of the system.

On the final sheet the entire costs are summarized for billing. Under the head ''Items,'' the number of each material slip, whether a debit or credit, is entered. The costs are accordingly entered, and the time on the jobs is taken from the time cards, all of which have to be accounted for. With the addition of overhead expense the exact costs are arrived at and the profit or loss is at once visible.

CONVENIENT FORMS FOR THE PLUMBER

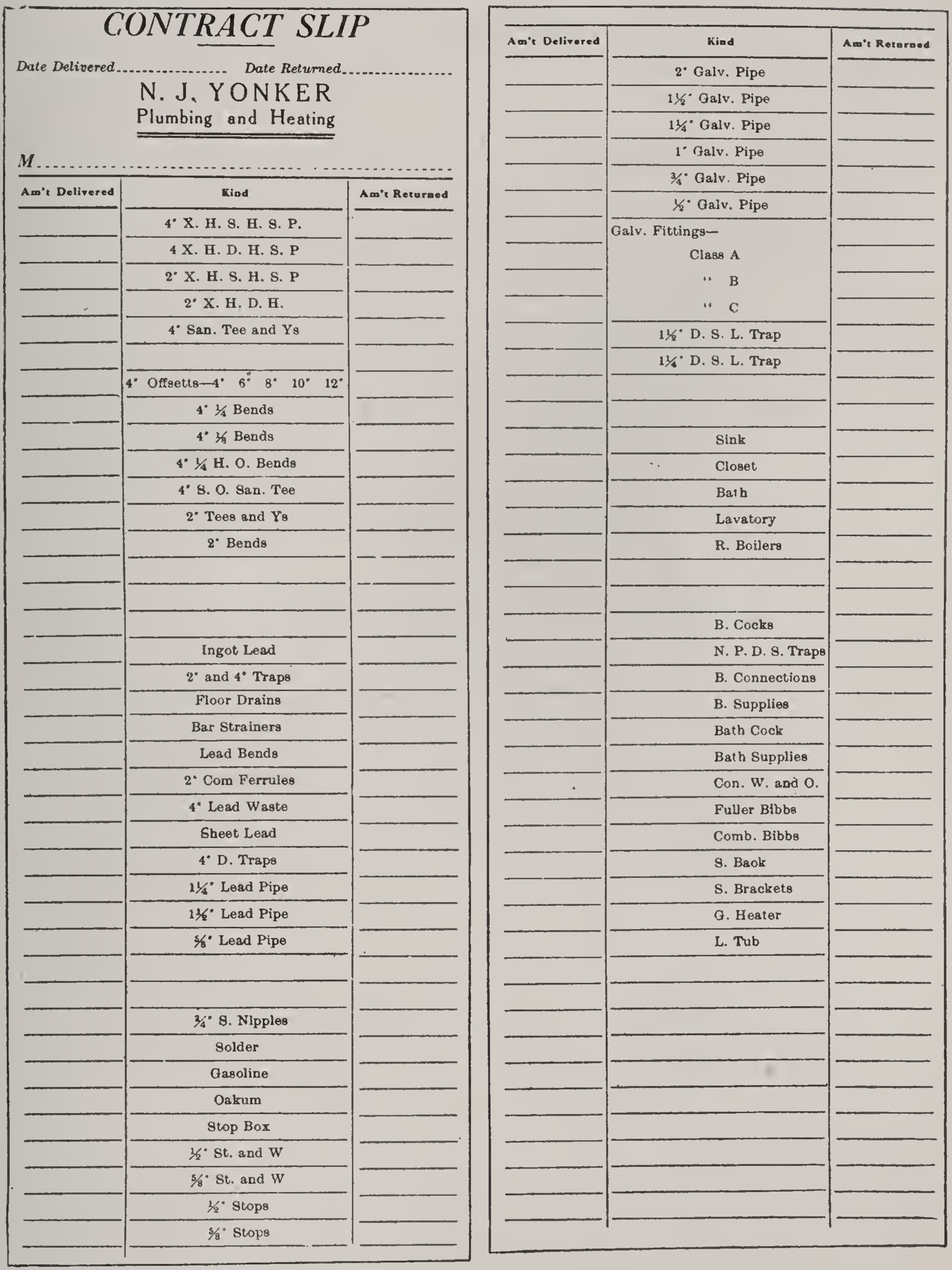
Suggestion as to Keeping Account of Time and Materials Shipped and Returned

A SIMPLE method of keeping account of materials shipped on any particular contract and the returns therefrom has been designed for his own use by N. J. Yonker, who conducts a plumbing and heating business at Holland, Mich. These slips are reproduced in the accompanying illustrations with the time card used by Mr. Yonker.

As a progressive master plumber and steam fitter he recognizes the urgent necessity of keeping costs accurately on all work. Outside of the records kept in his ledger, two slips are used, the contract slip and time card. The contract slip is a card four in. wide and 11 in. long. It is printed on both sides, having many lined spaces into which materials not already printed thereon can be inserted. This card is made out so as to serve the purpose of a delivery and return material sheet. The correct amounts are entered in their respective columns opposite the class of material taken out and returned.

The time card, reproduced herewith, is printed on both sides, one side for morning records and the other for afternoon work. The hours from seven in the morning until six in the evening are divided into quarter hours. By this means it is possible to check minutely the exact amount of time devoted to any particular job and to arrive at the proper cost.

The final costs of all work are drawn off in a ledger and a careful system of checking is maintained. Each section of the work is entered under a separate head from the time that the estimate is accepted. As materials are used, they are put in the column beside those estimated. The same is true of labor. Actual labor is sided with estimated labor. By this means, at the end



CONTRACT SLIP

Date Delivered................ *Date Returned*................

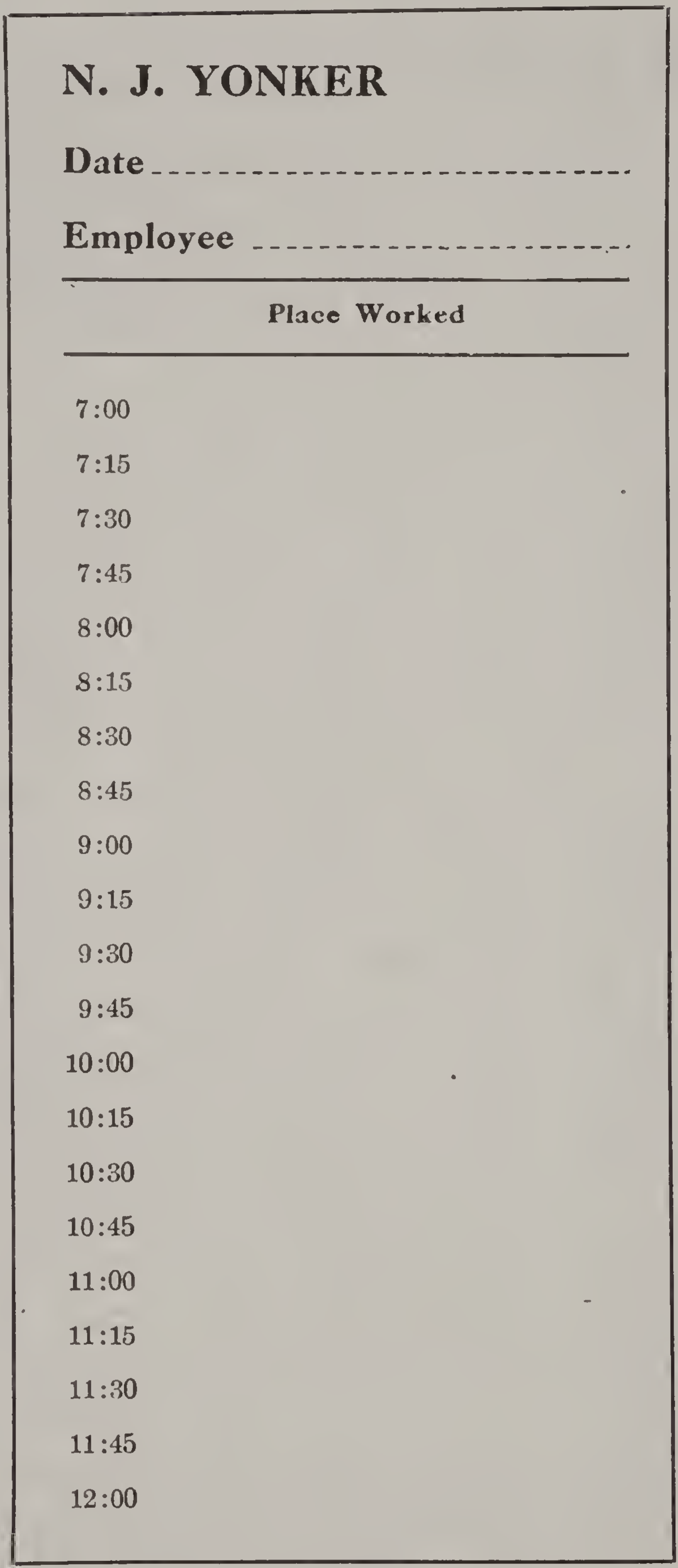
N. J. YONKER
Plumbing and Heating

M..

Am't Delivered	Kind	Am't Returned
	4" X. H. S. H. S. P.	
	4 X. H. D. H. S. P	
	2" X. H. S. H. S. P	
	2" X. H. D. H.	
	4" San. Tee and Ys	
	4" Offsetts—4" 6" 8" 10" 12"	
	4" ¼ Bends	
	4" ⅛ Bends	
	4" ¼ H. O. Bends	
	4" S. O. San. Tee	
	2" Tees and Ys	
	2" Bends	
	Ingot Lead	
	2" and 4" Traps	
	Floor Drains	
	Bar Strainers	
	Lead Bends	
	2" Com Ferrules	
	4" Lead Waste	
	Sheet Lead	
	4" D. Traps	
	1¼" Lead Pipe	
	1½" Lead Pipe	
	⅝" Lead Pipe	
	¾" S. Nipples	
	Solder	
	Gasoline	
	Oakum	
	Stop Box	
	½" St. and W	
	⅝" St. and W	
	½" Stops	
	⅝" Stops	

Am't Delivered	Kind	Am't Returned
	2" Galv. Pipe	
	1½" Galv. Pipe	
	1¼" Galv. Pipe	
	1" Galv. Pipe	
	¾" Galv. Pipe	
	½" Galv. Pipe	
	Galv. Fittings— Class A " B " C	
	1½" D. S. L. Trap	
	1¼" D. S. L. Trap	
	Sink	
	Closet	
	Bath	
	Lavatory	
	R. Boilers	
	B. Cocks	
	N. P. D. S. Traps	
	B. Connections	
	B. Supplies	
	Bath Cock	
	Bath Supplies	
	Con. W. and O.	
	Fuller Bibbs	
	Comb. Bibbs	
	S. Back	
	S. Brackets	
	G. Heater	
	L. Tub	

Facsimile of Both Sides of Contract Slip Showing Provision for Accounting for Material Shipped and Returned of a contract it is possible to ascertain just how close the estimates were to the actual results. This enables Mr. Yonker to figure intelligently on future work and at the same time produce him a profit commensurate with the work undertaken.



N. J. YONKER

Date ____________________________

Employee ______________________

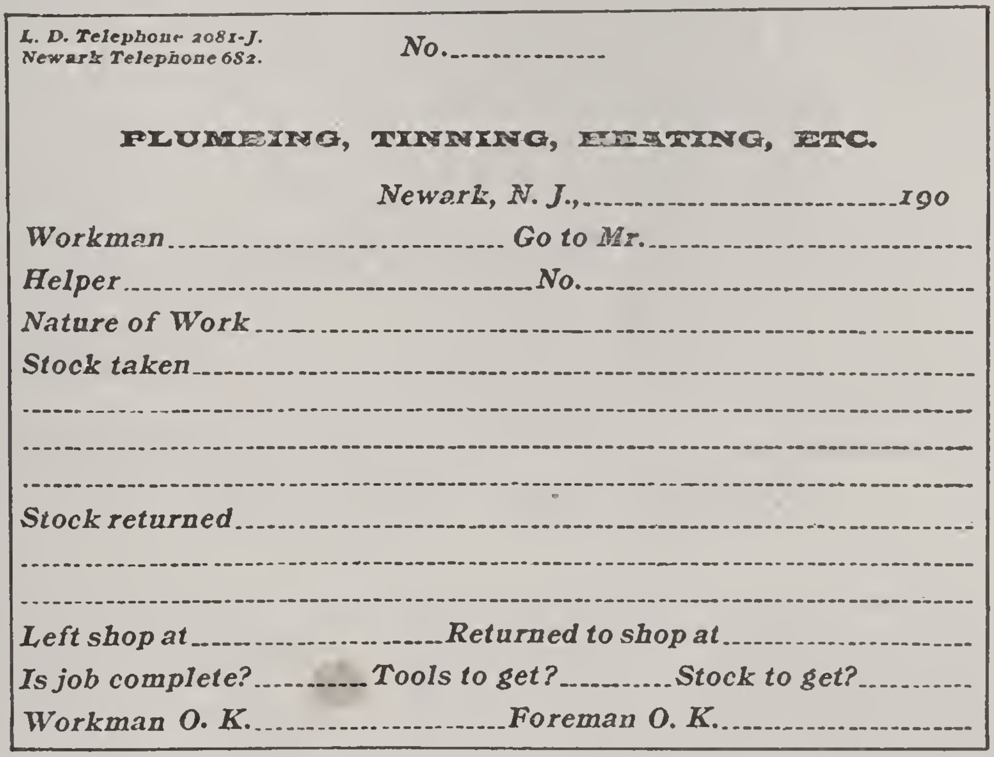
Place Worked

7:00
7:15
7:30
7:45
8:00
8:15
8:30
8:45
9:00
9:15
9:30
9:45
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00

Facsimile of Face of Time Card

KEEPING RECORD OF PLUMBING WORK

A simple system for the use of a plumber catering particularly to the jobbing trade was designed by a plumber of Newark, N. J., with the end in view of not only keeping a close account of all stock used but also of keeping a clear record to make it an easy matter to prove his case to customers who may dispute his bill. Two of the blanks used in his office system are reproduced in the accompanying illustration.



L. D. Telephone 2081-J.
Newark Telephone 682.
No. ....

PLUMBING, TINNING, HEATING, ETC.

Newark, N. J., ... *190*

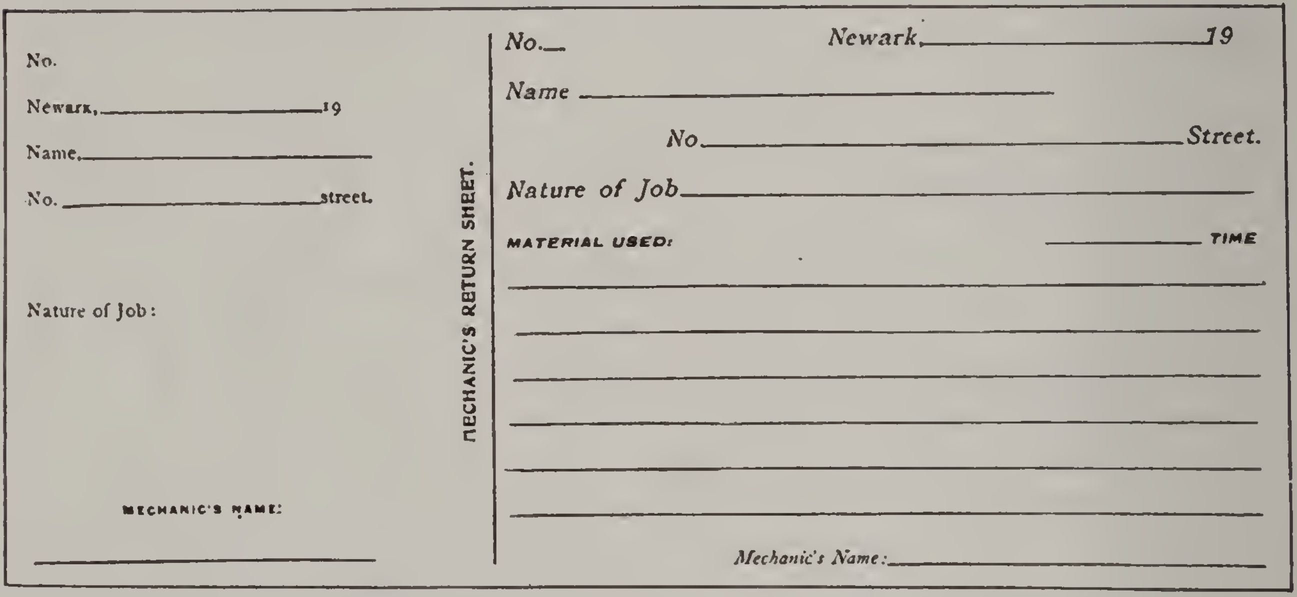
Workman .... *Go to Mr.* ....
Helper .... *No.* ....
Nature of Work ....
Stock taken ....
....
....
....
Stock returned ....
....
....
Left shop at .... *Returned to shop at* ....
Is job complete? .... *Tools to get?* .... *Stock to get?* ....
Workman O. K. .... *Foreman O. K.* ....

Workman's Instruction Blank

The first illustration shows the blank that is handed to a workman when he is to go out to execute an order. This is an instruction slip really to the workmen. It will be noticed there is a space in which the office man may fill in the workman's name and that of his helper with full particulars as to the location of the job. Then there are four lines in which either the office man or foreman may write out the material which is to be taken from stock.

This is important as, if care is exercised in taking the order and filling in this information, there is no delay caused by the helper having to return to the shop for material which should have been taken along on the first trip.

When the job has been completed the workman fills in the material to be returned. This is checked when it is received at the shop. Further information on the job is supposed to be given by the workman as to the time he left and when he returned to the shop. He also is required to state whether or not the job is complete and if there are stock or tools to get he is to fill in the answer, Yes, or No, to the question. There is also a space for the O. K. of both the workman and foreman. This is provided so that if the job is not satisfactory and the customer complains the shop owner will know at a glance by whom the work was done. The workman carries this card with him and it serves as an identification card when he reaches the house in which the work is to be done.



No.

Newark, 19

Name,

No. street.

Nature of Job:

MECHANIC'S NAME:

MECHANIC'S RETURN SHEET.

No.

Newark, 19

Name

No. Street.

Nature of Job

MATERIAL USED:

TIME

Mechanic's Name:

Mechanic's Return Slip and Order

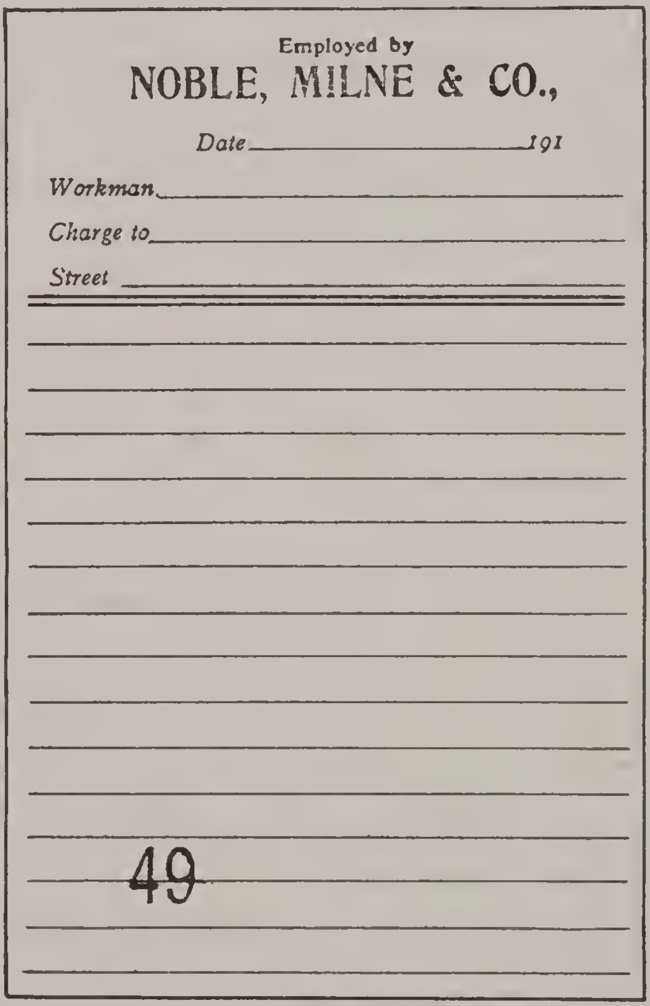
The second illustration shows the type of charge sheet or mechanic's return sheet used. This is a perforated sheet and is made up in padded form, usually four to the page. When the order is received it is given a number and dated. Full information is entered on the stub and the number, date, name, address and nature of the job filled in on the slip which is given to the mechanic. The mechanic is supposed to fill in the material he uses and both his own time and that of his helper spent not only on the job but in the shop in case there is any shop work to be done. The material used should check with the difference between the material taken from the shop and that returned.

When the sheet is turned in the office man prices the material and makes out his bill for the customer and then files away all the monthly sheets in one compartment of his file. Should a customer complain of too great a charge when he receives his bill or monthly statement the shop owner can very readily hunt up this card and show him a complete record. Frequently a customer complains that the workmen only spent, say, five hours on the job while a charge is made for eight hours' time, often forgetting that there is work such as cutting and threading pipe, which can be more conveniently done in the shop than on the job. This card is intended to keep a record of just such things and to be used in satisfying customers.

TIME AND STOCK KEEPING BLANKS

Examples of Methods Employed by Shop Owners in Recording Time, Materials and Cost of Jobs

ALTHOUGH the impression has been allowed to go abroad that the average master plumber is an individual with only the most elementary ideas as to how his business should be conducted, there is in reality very little reason for any such supposition. On the contrary, the master plumber as a business man compares very favorably with the person engaged in any other trade. It is unfair to take the master plumber who has only a small capital employed in his business and who does not desire to do business on any other than a limited scale and compare



Employed by

NOBLE, MILNE & CO.,

*Date*____________________*191*

*Workman*____________________________

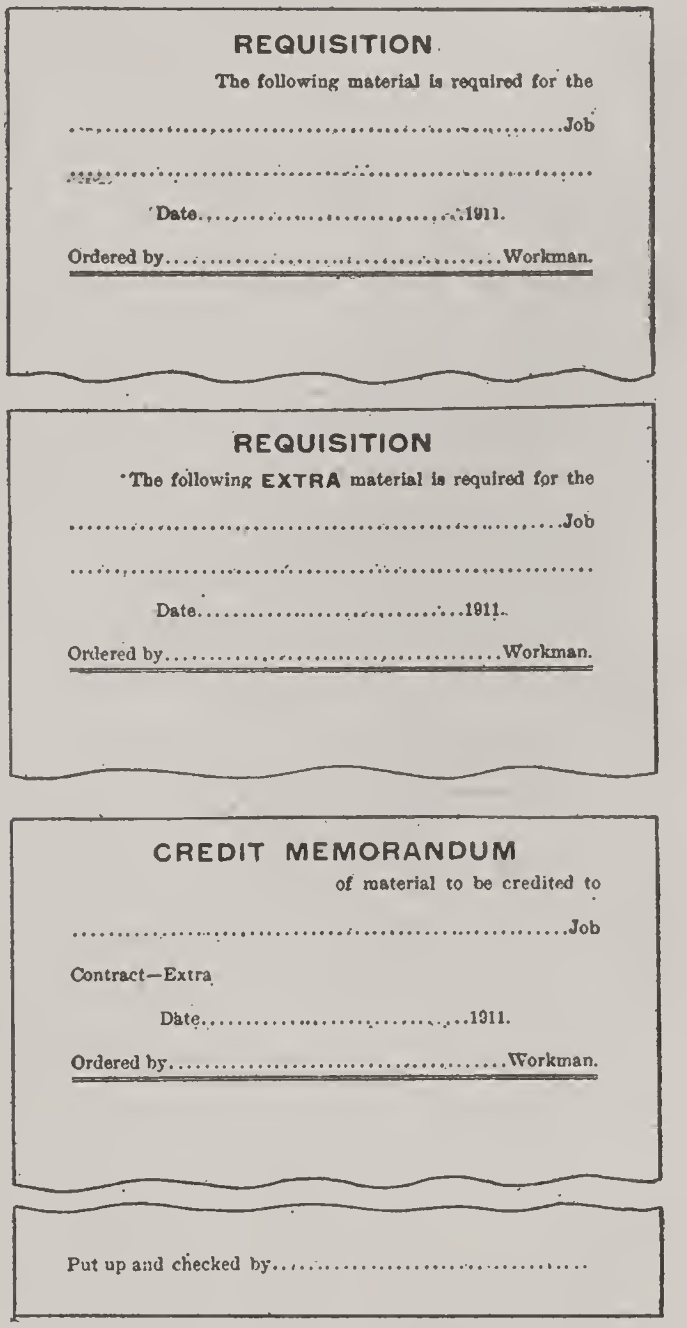
*Charge to*____________________________

Street ____________________________

49

Facsimile of Daily Time Card

his business methods with those of large and powerful business combinations in another line of trade and then conclude that the whole profession is lax, ignorant and incapable of big business. The only fair comparison is to compare a small man with a small man, big business with big business, and if this is done the plumbing profession will not suffer by comparison.



REQUISITION

The following material is required for the

....Job

....

Date..............................1911.

Ordered by..............................Workman.

REQUISITION

The following **EXTRA** material is required for the

....Job

....

Date..............................1911.

Ordered by..............................Workman.

CREDIT MEMORANDUM

of material to be credited to

....Job

Contract—Extra

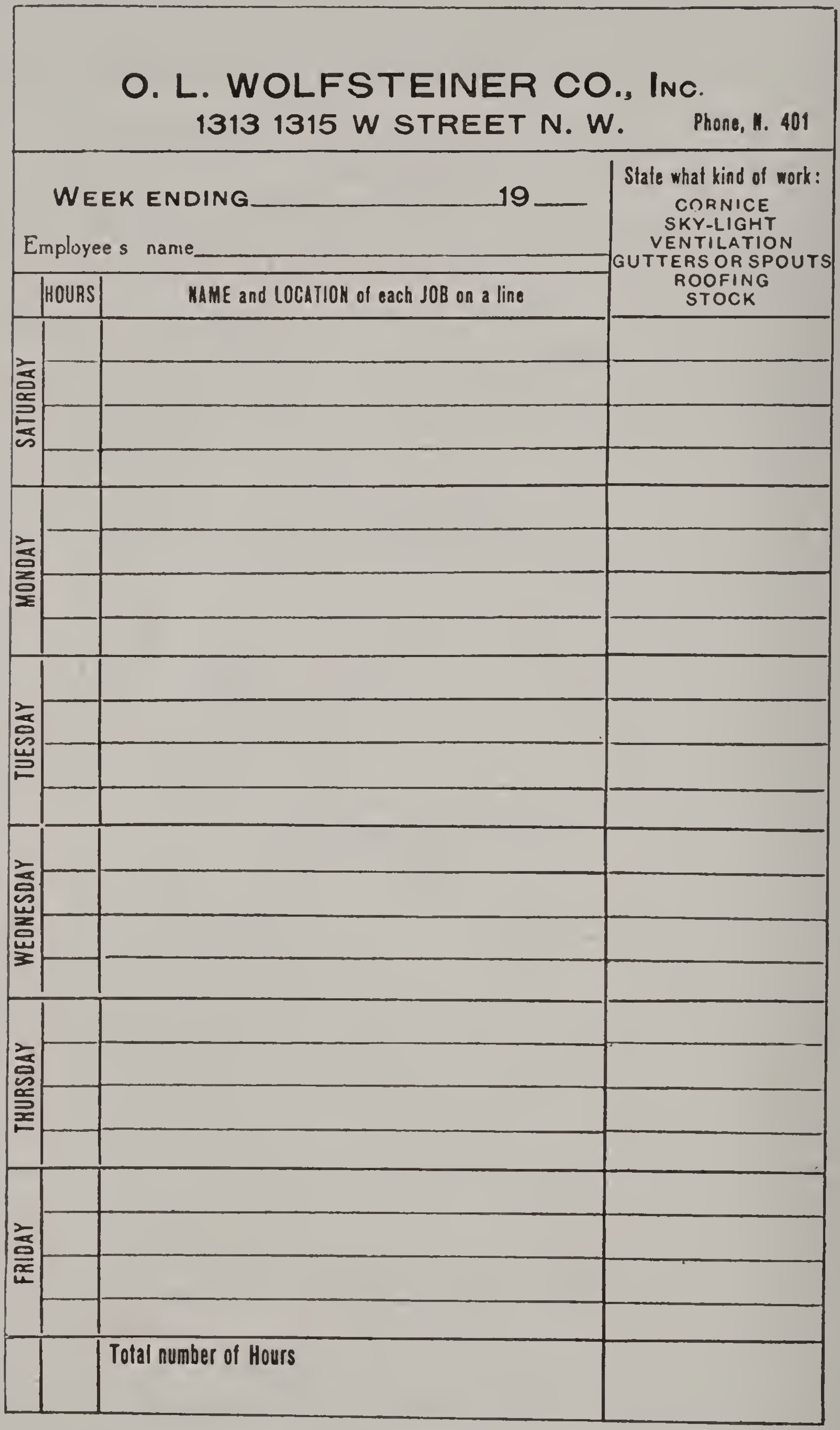
Date..............................1911.

Ordered by..............................Workman.

Put up and checked by..............................

Requisition and Credit Cards for Stock Used or Returned from Individual Jobs

The small man is quite willing to learn from those more experienced in business methods, the large man from his competitor, and both are willing to give the results of their experience to each other. Evidence of this is not wanting in the frequent application to *Metal Worker* for criticism of certain shop methods or aid to accuracy in estimating and bookkeeping. One of the most recent requests for some comments on a method of keeping accounts and workmen's time has brought in a number of



O. L. WOLFSTEINER CO., Inc.
1313 1315 W STREET N. W. Phone, N. 401

WEEK ENDING ______________ 19____
Employee s name ______________

	HOURS	NAME and LOCATION of each JOB on a line	State what kind of work: CORNICE SKY-LIGHT VENTILATION GUTTERS OR SPOUTS ROOFING STOCK
SATURDAY			
MONDAY			
TUESDAY			
WEDNESDAY			
THURSDAY			
FRIDAY			
		Total number of Hours	

Weekly Time and Stock Card

replies and descriptions of methods in use by up-to-date firms in various parts of the country. There has been selected from those the method used by Noble, Milne & Co., Pittsfield, Mass., and also those found satisfactory by O. L. Wolfsteiner Co., Inc., Washington, D. C.

The first is a good example of the method that calls for a separate charge slip for each job. All slips are in pads and in duplicate form so that carbon copies of the entry are made and it is a very simple matter to keep a check on both time and material. The fact that the workmen's time slips are numbered, as will be noted in the accompanying facsimile of one of these time slips, makes the computation of the week's time for the pay roll simpler as the slips should be charged up with the numbers running consecutively.

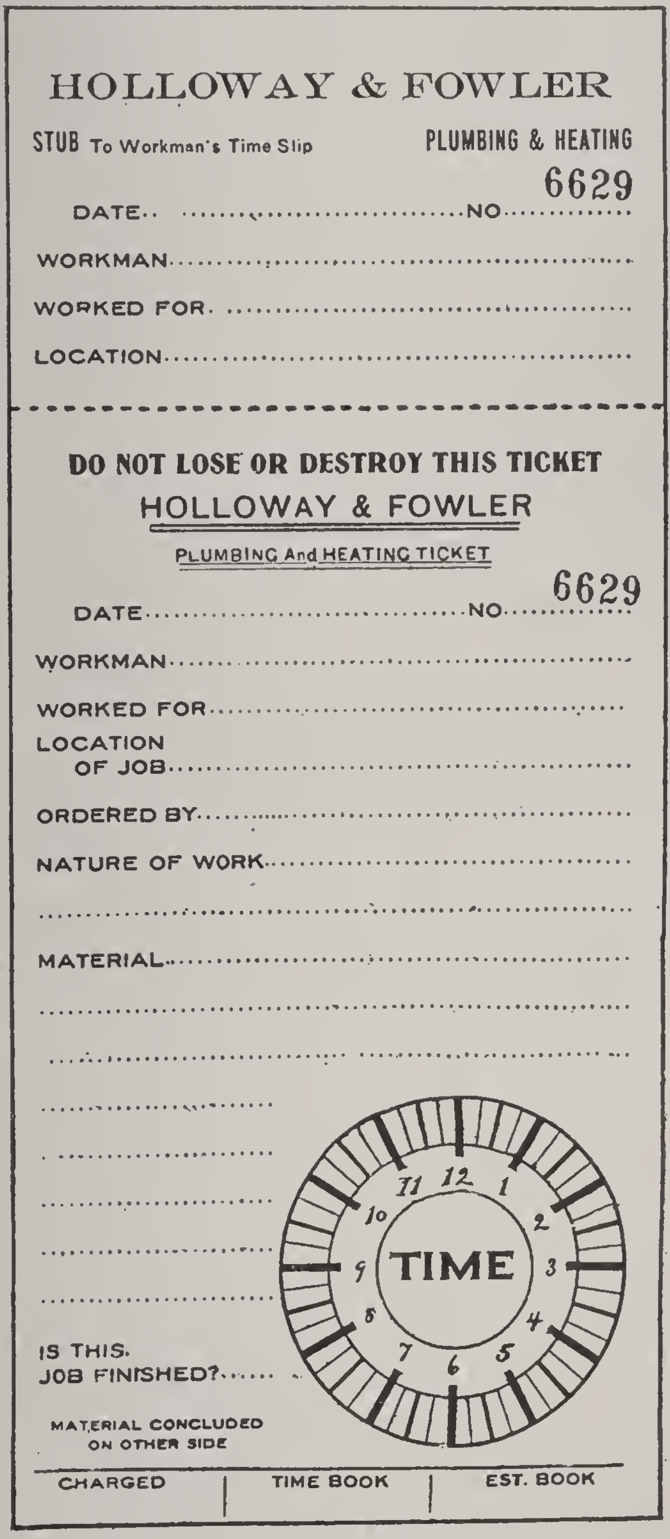
The requisition slips for the material required are colored differently. The one issued by the workman to the store keeper when he goes out on a job is white. If he finds he requires additional material he sends in a blue-colored slip. When he finishes the work he sends in a credit memorandum which is of the same size as the charge slips but is yellow in color. The headings of these three slips are shown in another illustration. These may be any length desired, but should have ample blank space on which to list the material taken out or returned. The bookkeeper charges up the debit slips from the carbon copy as the material is taken out and credits the returns in the proper columns of the account book. He then carries forward the difference against the customer. Time is entered up against the account as the slips come in from the men, with the proper date entered.

Another firm in Connecticut uses a similar method but does not duplicate the time slip. These are issued in the form of cards with spaces for the average number of jobs that each workman handles in one day. If he is engaged on contract work he states the name in the proper space on the card of the customer and marks it plumbing contract, heating, gas fitting or whatever the work in hand may be.

A space at the foot of the card is set aside for remarks. Any minor expense the workman may have been put to, such as purchase of small supplies to obviate the necessity of a trip to the shop, car fares and mileage are entered by him in this space. A card must be turned in every evening or before commencing work the following day by each man and each day his time is entered to his credit on a special page allotted to him in the day book. Payments and advances of expense money made to him are charged against his account and this is balanced weekly. The day's time is also charged up against the job he is engaged upon daily. Material is charged up and credited in the same manner as that followed by Noble, Milne & Co. The same method is used for contract work as for jobbing work, the result being an accurate knowledge of the net cost of labor and material on each individual job.

The weekly slip used by the O. L. Wolfsteiner Co., as shown in another illustration, does not call for so much daily bookkeeping and is very suitable for a sheet metal shop where the foreman can keep close account of the stock used.

AN EFFECTIVE CHARGE SLIP FOR PLUMBING AND HEATING SHOPS



HOLLOWAY & FOWLER

STUB To Workman's Time Slip PLUMBING & HEATING

6629

DATE............................NO..............

WORKMAN..

WORKED FOR..

LOCATION...

DO NOT LOSE OR DESTROY THIS TICKET

HOLLOWAY & FOWLER

PLUMBING And HEATING TICKET

6629

DATE..................................NO..............

WORKMAN..

WORKED FOR..

LOCATION OF JOB....................................

ORDERED BY...

NATURE OF WORK...................................

MATERIAL..

IS THIS JOB FINISHED?......

MATERIAL CONCLUDED ON OTHER SIDE

CHARGED | TIME BOOK | EST. BOOK

TIME
12
1
2
3
4
5
6
7
8
9
10
11

A problem hard to solve by many employers is that of keeping track of labor and material charges on plumbing and heating jobs in such a manner that the workmen can easily understand the system while retaining a means of checking the charges to guard against mistakes arising through carelessness or inattention. Many different forms of charge and time cards have been illustrated and described in *Metal Worker, Plumber and Steam Fitter*, from time to time, but that used by Holloway & Fowler, Tremont, Nebraska, possesses some novel features which may be of interest and value to those who have need of a system which has proved satisfactory. In this case both time and material are charged on the same slip, and as will be seen from the illustration, this is perforated so that when detached from the book in which the slips are furnished a stub is left on which an entry is made for the purpose of checking the charge made on the part given the workman.

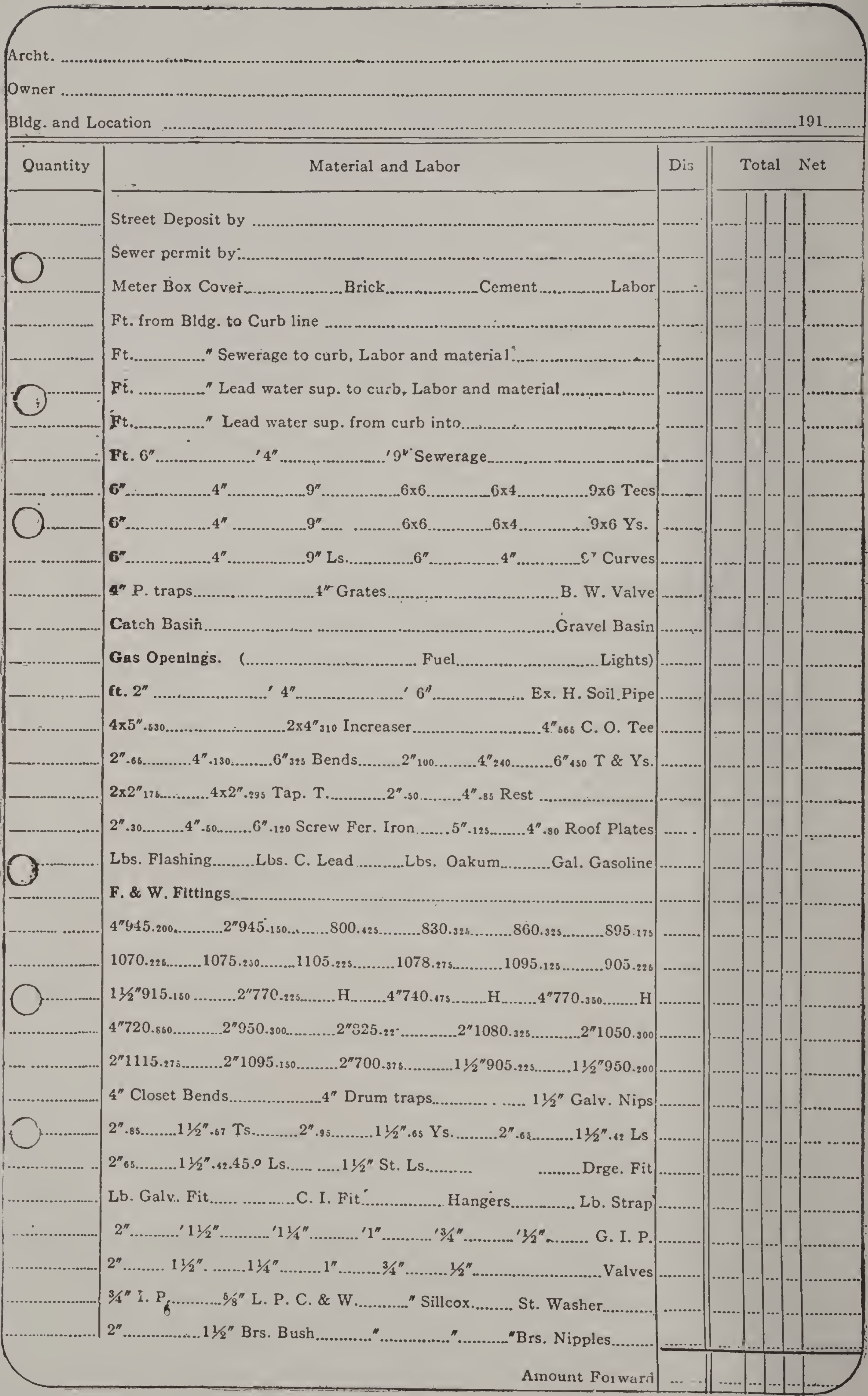
As stub and slip are numbered alike the check is effective in proving the entry of the time by the workman, as his charge is made to be entered against the customer and to be credited to himself on the pay roll. The part on which the time occupied in completing the work is entered is striking, and the day's work can be seen from it at a glance. The slips possess the recommendation of simplicity, and when properly entered and filed form an effective check on both work completed and uncompleted.

A LOOSE-LEAF ESTIMATING SHEET

An estimating sheet for figuring on residence and flat building work is used advantageously by J. A. Lindstedt, a Chicago master plumber with progressive ideas. The sheet is eight inches long and five inches wide, printed on both sides. It is carried about in a loose leaf booklet and is very handy and convenient.

It is complete in details required for the estimating of such work and has the current prices inserted opposite the various materials. Under the F & W fittings, the prices are already printed in small figures. The numerals 4″ 945.200 signify the size of fitting, catalogue number and price. For reference purposes the prices on other materials are inserted in ink, the entry being in accordance with the invoice price on the last consignment.

On the completion of the contract the estimated and actual costs can be easily compared. The user of this sheet has found the slip extremely valuable and indispensable. Facsimiles of both sides of this sheet will be found on the two succeeding pages.



Archt. ....

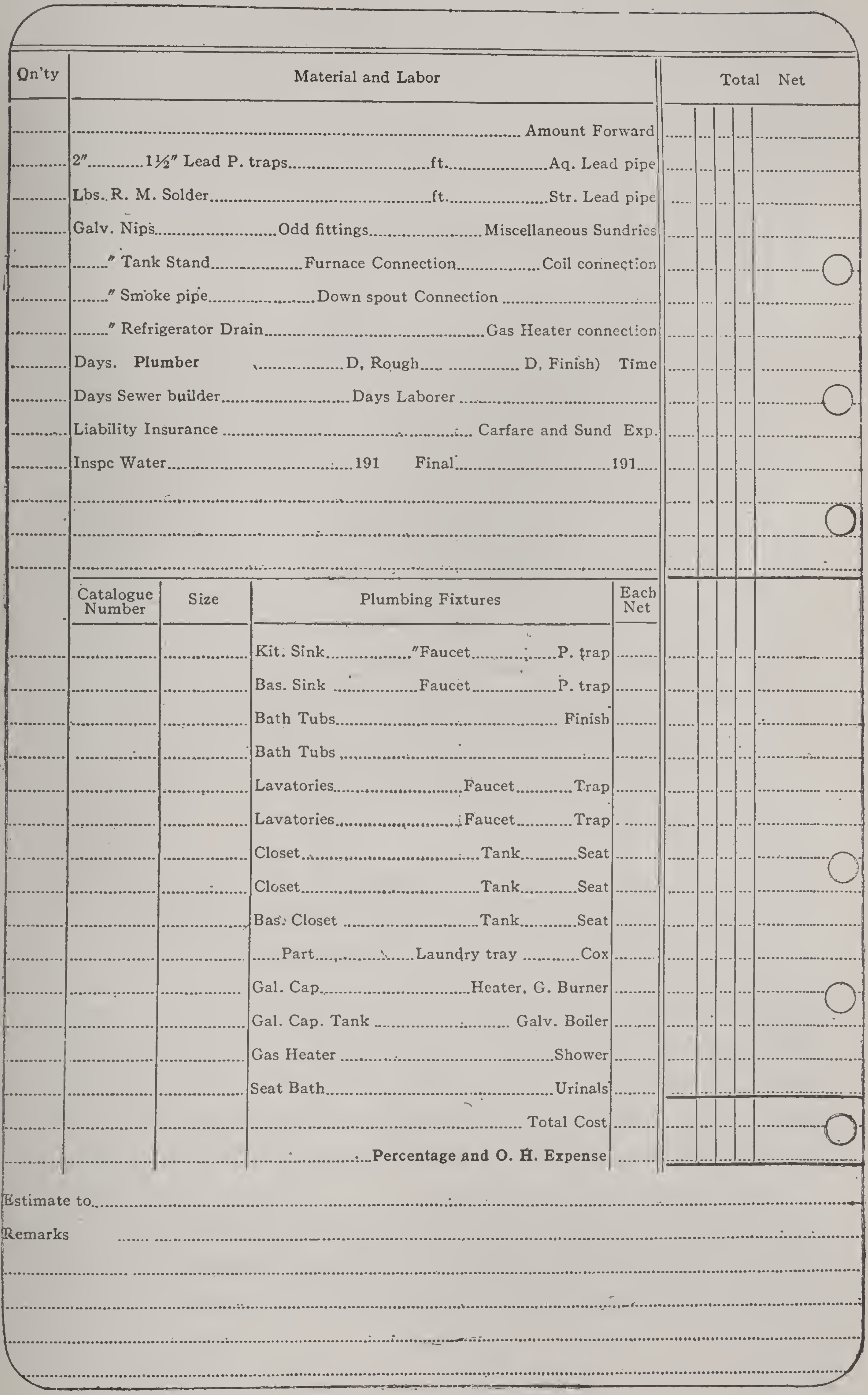
Owner ....

Bldg. and Location .... 191......

Quantity	Material and Labor	Dis	Total	Net
	Street Deposit by			
	Sewer permit by			
	Meter Box Cover.......... Brick.......... Cement.......... Labor			
	Ft. from Bldg. to Curb line			
	Ft.........." Sewerage to curb, Labor and material..........			
	Ft. ...." Lead water sup. to curb, Labor and material..........			
	Ft.........." Lead water sup. from curb into..........			
	Ft. 6"..........'4"..........'9" Sewerage..........			
	6"..........4"..........9"..........6x6..........6x4..........9x6 Tees			
	6"..........4"..........9"..........6x6..........6x4..........9x6 Ys.			
	6"..........4"..........9" Ls..........6"..........4"..........9" Curves			
	4" P. traps..........4" Grates..........B. W. Valve			
	Catch Basin..........Gravel Basin			
	Gas Openings. (.......... Fuel..........Lights)			
	ft. 2" ....' 4"..........' 6".......... Ex. H. Soil Pipe			
	4x5".630..........2x4"310 Increaser..........4"666 C. O. Tee			
	2".66..........4".130..........6"325 Bends..........2"100..........4"240..........6"450 T & Ys.			
	2x2"176..........4x2".295 Tap. T..........2".50..........4".85 Rest			
	2".30..........4".60..........6".120 Screw Fer. Iron..........5".125..........4".80 Roof Plates			
	Lbs. Flashing..........Lbs. C. Lead..........Lbs. Oakum..........Gal. Gasoline			
	F. & W. Fittings..........			
	4"945.200..........2"945.150..........800.425..........830.325..........860.325..........895.175			
	1070.226..........1075.250..........1105.225..........1078.275..........1095.125..........905.226			
	1½"915.160..........2"770.225..........H..........4"740.475..........H..........4"770.350..........H			
	4"720.660..........2"950.300..........2"825.22..........2"1080.325..........2"1050.300			
	2"1115.275..........2"1095.150..........2"700.376..........1½"905.225..........1½"950.200			
	4" Closet Bends..........4" Drum traps.......... 1½" Galv. Nips			
	2".85..........1½".67 Ts..........2".95..........1½".65 Ys..........2".65..........1½".42 Ls			
	2"65..........1½".42.45.o Ls..........1½" St. Ls.......... ....Drge. Fit			
	Lb. Galv. Fit..........C. I. Fit..........Hangers..........Lb. Strap			
	2"..........'1½"..........'1¼"..........'1"..........'¾"..........'½".......... G. I. P.			
	2".......... 1½"..........1¼"..........1"..........¾"..........½"..........Valves			
	¾" I. P..........⅝" L. P. C. & W.........." Sillcox.......... St. Washer..........			
	2"..........1½" Brs. Bush.........."..........".........."Brs. Nipples..........			
	Amount Forward			

First Page of Loose-Leaf Estimating Sheet

A Loose-Leaf Estimating Sheet



Qn'ty	Material and Labor	Total Net
	Amount Forward	
	2″ ...... 1½″ Lead P. traps ...... ft. ...... Aq. Lead pipe	
	Lbs. R. M. Solder ...... ft. ...... Str. Lead pipe	
	Galv. Nips ...... Odd fittings ...... Miscellaneous Sundries	
	...... ″ Tank Stand ...... Furnace Connection ...... Coil connection	
	...... ″ Smoke pipe ...... Down spout Connection	
	...... ″ Refrigerator Drain ...... Gas Heater connection	
	Days. Plumber ...... D, Rough ...... D, Finish) Time	
	Days Sewer builder ...... Days Laborer	
	Liability Insurance ...... Carfare and Sund Exp.	
	Inspc Water ...... 191 Final 191	

Catalogue Number	Size	Plumbing Fixtures	Each Net	Total Net
		Kit. Sink ...... ″Faucet ...... P. trap		
		Bas. Sink ...... Faucet ...... P. trap		
		Bath Tubs ...... Finish		
		Bath Tubs		
		Lavatories ...... Faucet ...... Trap		
		Lavatories ...... Faucet ...... Trap		
		Closet ...... Tank ...... Seat		
		Closet ...... Tank ...... Seat		
		Bas. Closet ...... Tank ...... Seat		
		...... Part ...... Laundry tray ...... Cox		
		Gal. Cap. ...... Heater, G. Burner		
		Gal. Cap. Tank ...... Galv. Boiler		
		Gas Heater ...... Shower		
		Seat Bath ...... Urinals		
		Total Cost		
		Percentage and O. H. Expense		

Estimate to ......

Remarks ......

Second Page of Loose-Leaf Estimating Sheet

ESTIMATING BY AID OF TOPOGRAPHIC MAP

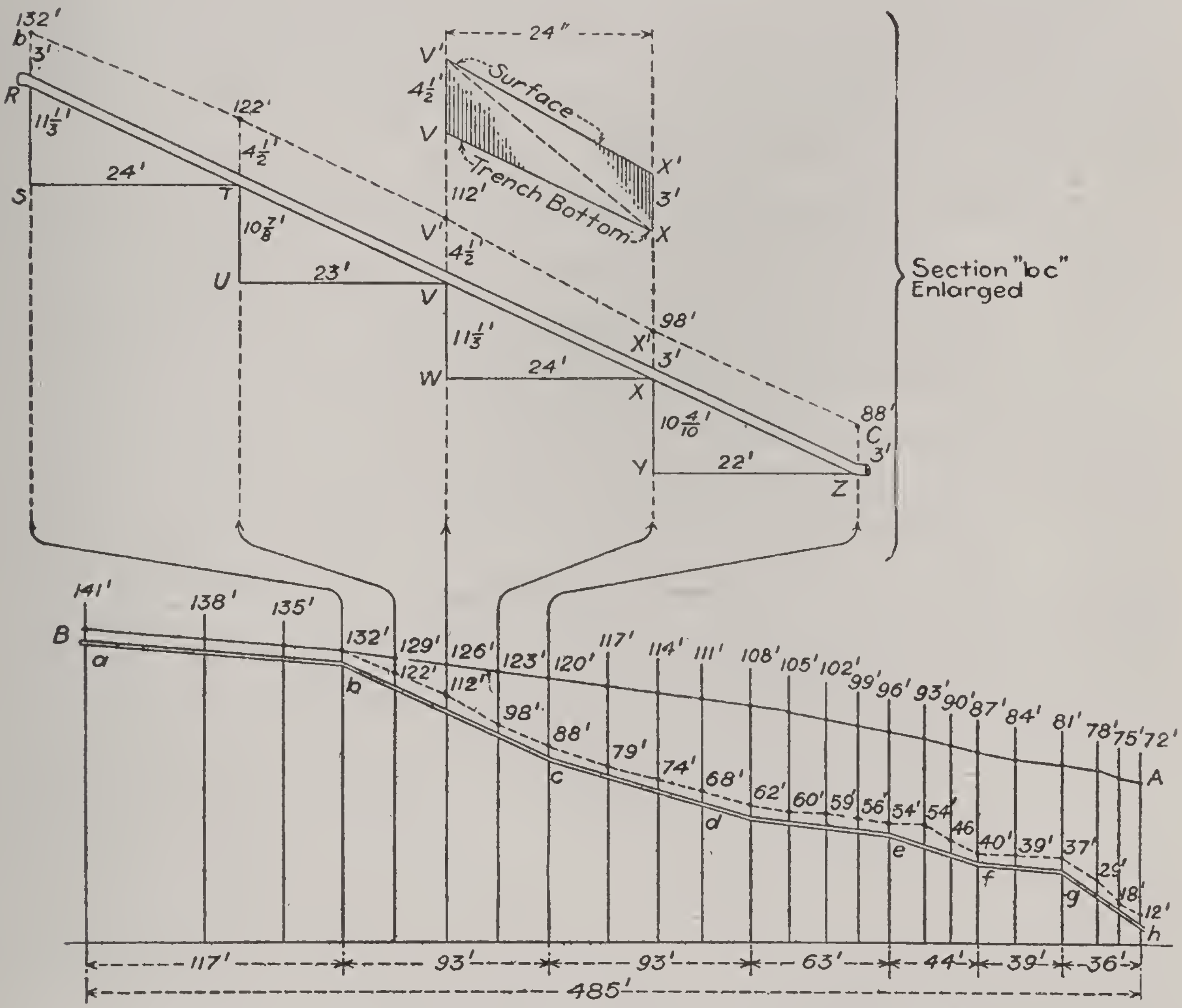
Example of Figuring Amount of Earth to Be Removed in Trench Work Where Survey Has Been Made

By W. L. Mason

In *Metal Worker* of September 15 were some remarks about the aid of topographic maps in estimating, together with a map of this kind. I had intended figuring some contracts in that line as a matter of practice, and had developed a contour from the map in question, as shown by the solid line B to A, following the line of figures on the topo-lines of the map referred to. That particular course gave a rather regular contour to the eye and promised to make any advantages of developed grades, over maintaining at least a specified minimum grade at whatever depth required, principally evident in the figures obtained. At this point plans and specifications, accompanied by a topo-map of the premises, came in for a bid on the job, and my practice work changed to straight-away business.

The course of the drain indicated was over decidedly rougher ground than the practice map represented. It is shown roughly dotted in, to the same scale (50 feet per inch) and on the same ordinates as laid out from the *Metal Worker* map. The contour 141′ to 132′ is given as the same in both maps, while 132′ to 12′, indicated by dotted lines, is much steeper and broken. What datum the figures refer to is of little consequence to the estimator. The relative levels of various points affecting the work is about all he cares about. The levels being shown in feet by the figures and the horizontal distances being to a scale, the relation of levels and distance from point to point can easily be determined.

The first step in making the section shown was to draw the line at the bottom (base), representing at all points the lowest ground level on the map. Perpendicular to this and also to the pipe route on the map the ordinates were erected so as to cut the topo-lines on the map at the route line, the tracing paper having been laid over the map with the bottom (low level) line parallel to the pipe route and far enough away to permit setting off to the scale the slightest elevation to be used. The same result would have been obtained by measuring, or stepping with dividers, the distance between the topo-lines along the trench or pipe route, setting off the same in like order on the bottom line and erecting vertical lines (ordinates) from these points.



Surface Contour Developed from Topographic Map

With the distances between ordinates thus established to the same scale as the map the next step is to mark a point on each ordinate, representing, to the scale of the map, the elevation of that point above the low-level line, as indicated by the corresponding topo-line (line on the map traversing points of equal elevation). If the low level used is above the datum (not zero on the map) the low-level elevation will have to be subtracted from each other elevation used in order to obtain the distances to set off by scale on the ordinates. The same result may follow from making the ordinates long enough to set off on them to scale the whole distance from the datum indicated to the levels given. The figures given on the ordinates in the section are ''feet elevation'' above the low-level plot datum in this case.

To follow the surface represented by levels 12′ to 132′, keeping a uniform frost depth below the surface, with a proper fall at the level spots, might be an effective but not a workmanlike job. The actual surface is not so smooth and regular as a small scale section makes it appear, and in some cases is much more broken than shown. The profile of the surface shows the principal ups and downs, helps to determine better pipe grades, shows where saving in trench work may be accomplished, suggests the amount of shoring up that may be necessary and gives the length of pipe. In the pipe line drawn in on the section are six changes of grade, approximating the surface, and marked by *b, c, d, e, f* and *g*. Though the grades shown do not do so, the object was in this, as in all similar work, to establish such as would give the least work consistent with a good job.

This example is not to be taken as a measure of the benefit accruing from such practice, but rather as a basis for explaining the mode of work. Including with the grade *d e* the distance from 54′, next 56′ to 54′, next 46′ would have made less work; extending grade *b c* to reach the frost depth at ordinate 135′ would have increased the work.

The section having been laid out to scale with all necessary figures jotted on it, the question of quantity of material to be excavated might be approached in several ways. Some would doubtless use the algebraic sum rule for trench side area, but the easiest plan is to follow the simple old-fashioned method here given. It will not be necessary, for illustration, to figure more than the trench contents between a single pair of ordinates. To do this in detail with the best result, section *b c* of the trench has been enlarged and set over the general section, with some extra data added, as shown.

The side area of the trench from ordinate to ordinate is the first requisite, and the first step in finding same will generally be to remember the rule for areas of triangles and apply it to the portion of the trench in hand, as follows: The sense of the rule is, half the base of any triangle multiplied by its vertical height gives a product equal to the area. This is just the same as saying: The base of any triangle multiplied by half its vertical height gives a product equal to the area. These propositions are equally true whether the apex of the triangle is over the base or somewhere far or near to the right or left.

As proof let us test with the triangles indicated in the rhomboid parallelogram VV′X′X, sketched between ordinates 112′ 98′ in the detail, taking the distance between ordinates, 24 ft., as the vertical height or altitude. For XX′V′ the base is thus 3 ft. and the altitude 24 ft. For VV′X the base is 4½ ft. and altitude 24 ft. Then by the first proposition: $1\frac{1}{2} \times 24 + (2\frac{1}{4} \times 24) = 90$. By the second way of putting it: $3 \times 12 = 36$; $4\frac{1}{2} \times 12 = 54$; $54 + 36 = 90$, the area in square feet in the side of the trench from ordinate 112′ to ordinate 98′; but it is quicker to employ a shorter equivalent of the foregoing, viz., the mean ordinate height (or mean vertical depth) of the trench multiplied by the horizontal distance between ordinates, thus: $3 + 4\frac{1}{2} = 7\frac{1}{2}$; $7\frac{1}{2} \div 2 = 3\frac{3}{4}$—mean vertical depth; $3\frac{3}{4} \times 24 = 90$—the same as obtained by adding the areas of the component triangles.

The side area of a section of trench in square feet having been calculated, it is only necessary to multiply by the width of the trench in feet to obtain the cubic feet in that section, which divided by 27 gives the cubic yards. If the trench is 2 ft. wide we have 180 cu. ft. or 6⅔ cu. yd. for the section in question; if 1½ ft. wide, 135 cu. ft. or 5 cu. yd. The material to be excavated from other sections is found in the same way.

The length of the trench bottom for the grade *b c* is equal to the square root of the sum of the total fall of the grade, squared, plus the horizontal distance covered by the grade, squared, thus: Total fall, $44 \times 44 = 1936$; $93 \times 93 = 8649$; $8649 + 1936 = 10{,}585$; $\sqrt{10{,}585} = 102.88$ ft.—the hypothenuse RZ of RS and YZ extended to intersection. The trench bottom fall between each pair of ordinates is found by subtracting the lesser ordinate elevation less the depth of trench from the greater elevation, less the depth of trench; to find the hypothenuse for the distance between single pairs of ordinates is unnecessary, an entire grade being the same fall per foot, regardless of the number of ordinates embraced; the total fall for the grade answers for the altitude (fall), and horizontal distance stands for the base of the triangle, the hypothenuse of which is equal to the length of the trench bottom for the section.

In the sketch RS, TU, VW and XY aggregate the total fall (44 ft.) of grade *b c*; ST, UV, WX and YZ make up 93 ft., the horizontal distance covered by *b c*. All of these figures are approximate and merely intended to illustrate the method of procedure.

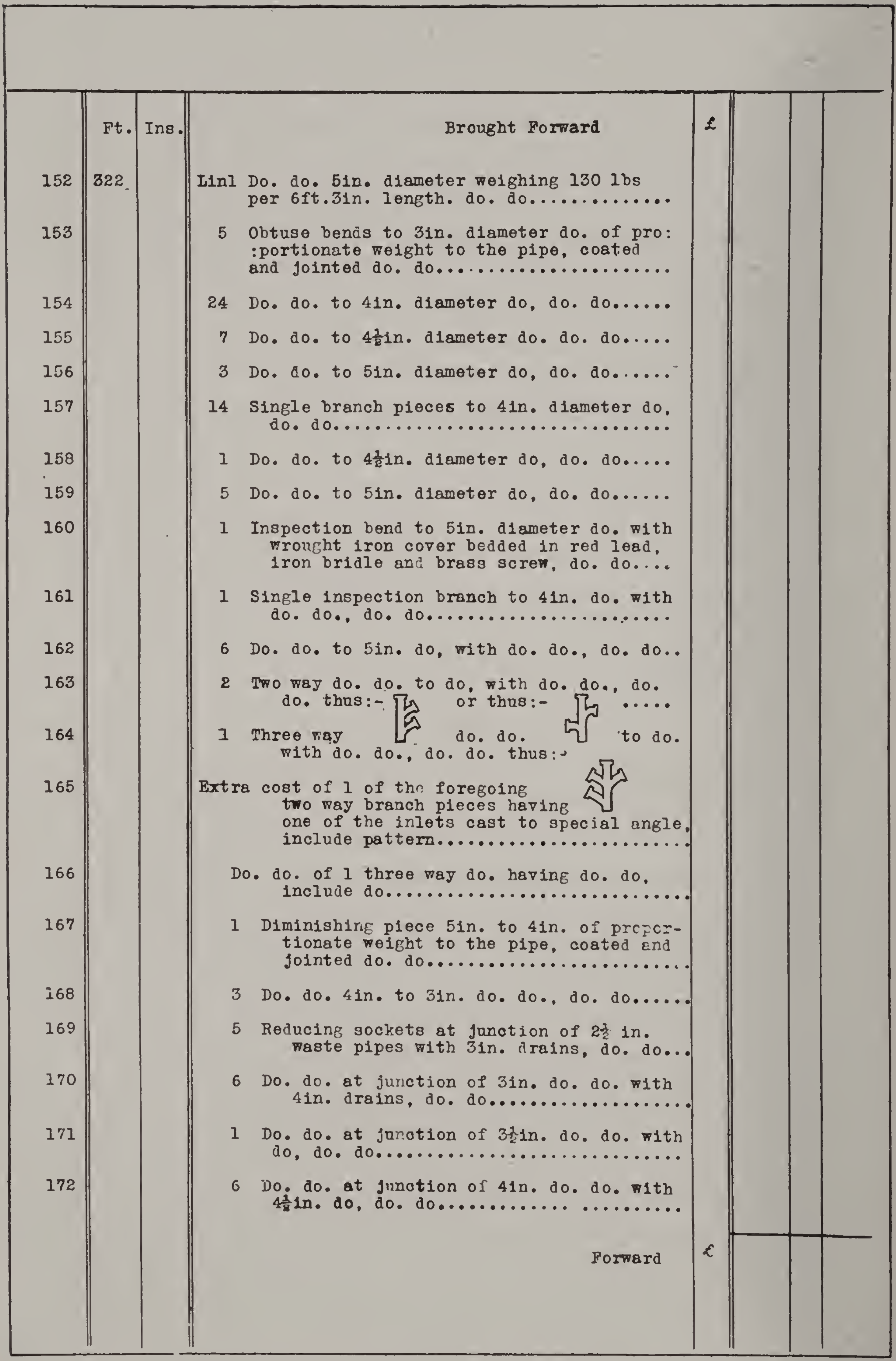
AN EQUITABLE ESTIMATING CUSTOM

Preparation of Estimates from Measurements Furnished by Architect with Fees Charged to Owner of Building

A CUSTOM of the building trades in Great Britain which has been in vogue for many years is that of estimating for the various divisions in building and engineering contracts from schedules of measurement prepared by the engineer or architect. The basis upon which the contracts are placed is so eminently fair to both parties that it has been observed among leaders in these lines of industry on this side of the Atlantic that it is a custom which might be adopted with advantage.

The accompanying illustrations are reproductions of the pages of schedules of measurement of additions to the plumbing work on a residence of a well known member of the aristocracy of England and of a large addition to a lunatic asylum in Scotland. The schedules are typical of what are provided on work of medium up to the largest size. Beside the schedule the contractor has the opportunity to examine the plans from which the schedules were prepared, so as to familiarize himself with the location of the various parts of the work he is estimating for and so that any structural difficulties he may have to overcome will be apparent and the cost of additional labor included in the prices asked by him.

Experience with the system has demonstrated, however, that it is possible to come very near to the cost of doing work under similar conditions at a definite addition to the price of the material and it is not uncommon for firms to submit bids on the figures contained in the schedules of measurement without even seeing the plans. This is possible because it is known that every additional foot or pound of material used over that measured will be paid



	Ft.	Ins.	Brought Forward	£		
152	322		Linl Do. do. 5in. diameter weighing 130 lbs per 6ft.3in. length. do. do.............			
153			5 Obtuse bends to 3in. diameter do. of pro: :portionate weight to the pipe, coated and jointed do. do.....................			
154			24 Do. do. to 4in. diameter do, do. do......			
155			7 Do. do. to 4½in. diameter do. do. do.....			
156			3 Do. do. to 5in. diameter do, do. do......			
157			14 Single branch pieces to 4in. diameter do, do. do..................................			
158			1 Do. do. to 4½in. diameter do, do. do.....			
159			5 Do. do. to 5in. diameter do, do. do......			
160			1 Inspection bend to 5in. diameter do. with wrought iron cover bedded in red lead, iron bridle and brass screw, do. do....			
161			1 Single inspection branch to 4in. do. with do. do., do. do........................			
162			6 Do. do. to 5in. do, with do. do., do. do..			
163			2 Two way do. do. to do, with do. do., do. do. thus:- or thus:-			
164			1 Three way do. do. to do. with do. do., do. do. thus:-			
165			Extra cost of 1 of the foregoing two way branch pieces having one of the inlets cast to special angle, include pattern..........................			
166			Do. do. of 1 three way do. having do. do, include do..............................			
167			1 Diminishing piece 5in. to 4in. of proportionate weight to the pipe, coated and jointed do. do.........................			
168			3 Do. do. 4in. to 3in. do. do., do. do......			
169			5 Reducing sockets at junction of 2½ in. waste pipes with 3in. drains, do. do...			
170			6 Do. do. at junction of 3in. do. do. with 4in. drains, do. do..................			
171			1 Do. do. at junction of 3½in. do. do. with do, do. do...........................			
172			6 Do. do. at junction of 4in. do. do. with 4½in. do, do. do.....................			
			Forward	£		

Special Fittings Included in Schedule of Measurements

Neither can he claim that any part of the work must be paid for as an ''extra'' without definite knowledge of the owner or architect beforehand as the surveyor responsible for the measurement in his capacity as arbiter between the interested parties must have evidence that work executed differently than planned for has been authorized. As in order to be in a position to effect a final adjustment he is required to visit the job and measure it as it progresses, it is apparent that he must be cognizant of the changes in ample time to bring irregularities to the attention of the owner or architect before they have been carried to a point where such would be irremediable.

In addition to the schedule of quantities there is included with each copy a specification which indicates the quality of the material to be provided and outlines any special requirements which may have to be met. While this specification may be one that the architect can use in connection with any schedule, it as a rule also contains clauses which apply particularly to the work in hand. Among such may be the provisions made for the accommodation of workmen or that of cartage. In one of the schedules from which pages have been reproduced it is stated that the owner will haul all materials from the nearest railroad station to the job and that outhouses will be provided for storage of supplies.

The architect also retains powers to reject any material not coming up to specified quality and also the power to make alterations to the work while in progress without vitiating the contract, or to deduct any part of the work from the contract and employ another firm to execute it. The latter clause is seldom taken advantage of but it affords protection to the owner should an incompetent or dishonest contractor succeed in being awarded the contract.

It may be urged as an objection to the plan that it is difficult to figure in the cost of labor on each item of material as it is arranged in the schedule. It seems to be the experience of contractors however that such is not the case, as while the practice of estimating from an ordinary plan and specification is also common, the schedule is much preferred. One contractor says that when he was called upon first to price his work in this fashion he found it necessary to fill the schedule in pencil, estimate the cost of labor and incidentals, including his overhead expense and profit, and add a percentage to the figures he had already obtained to cover these. Long experience has taught him just how much these items amount to and now he is able to reach his final prices as he goes along.

It is interesting to note on the schedules that in the plumbing contract, the roof work of the building is included. Lead flashings and ridges and also lead covering for various parts of the roof are specified while on the residence job, half round eaves gutters are specified to be made of No. 16 sheet zinc, with a large bead formed on the front, inside of which is to be placed an iron rod. The gutters are to be supported on galvanized straps placed two feet apart.

An allowance is also made for covering parapet walls with sheet lead and the drip boxes on an asphalt covered roof are specified to be lined with six-pound sheet lead with lead pipe offsets connecting them with cast iron conductor pipes. In the schedule of measurements on the asylum job certain special fittings are called for. Thumb-nail sketches of these are given so that the contractor may realize what he will have to provide and make allowance accordingly.

It is also stipulated that he will maintain the whole of his work in perfect condition for a period of two years from the date of completion and he is required to include a sufficient sum to cover the expense of replacement of fixtures or parts of the work which may prove imperfect in service.

The care with which the schedules are prepared is evident from one item which says:

''Allow for dressing back and afterwards re-dressing one end of old lead apron flashing,'' evidently where the new building adjoins the old and which would be necessary in order to allow the carpenters and slate roofers to carry out their contract. Other items which show that the measurer must be thoroughly conversant with every detail of the construction in order to prepare a schedule sufficiently accurate are in evidence. Possibly this requirement is sufficient to prevent its ready adoption where custom has put the whole burden of preparing estimates on the contractors desirous of obtaining the work.

KEEPING COSTS IN A PLUMBING ESTABLISHMENT

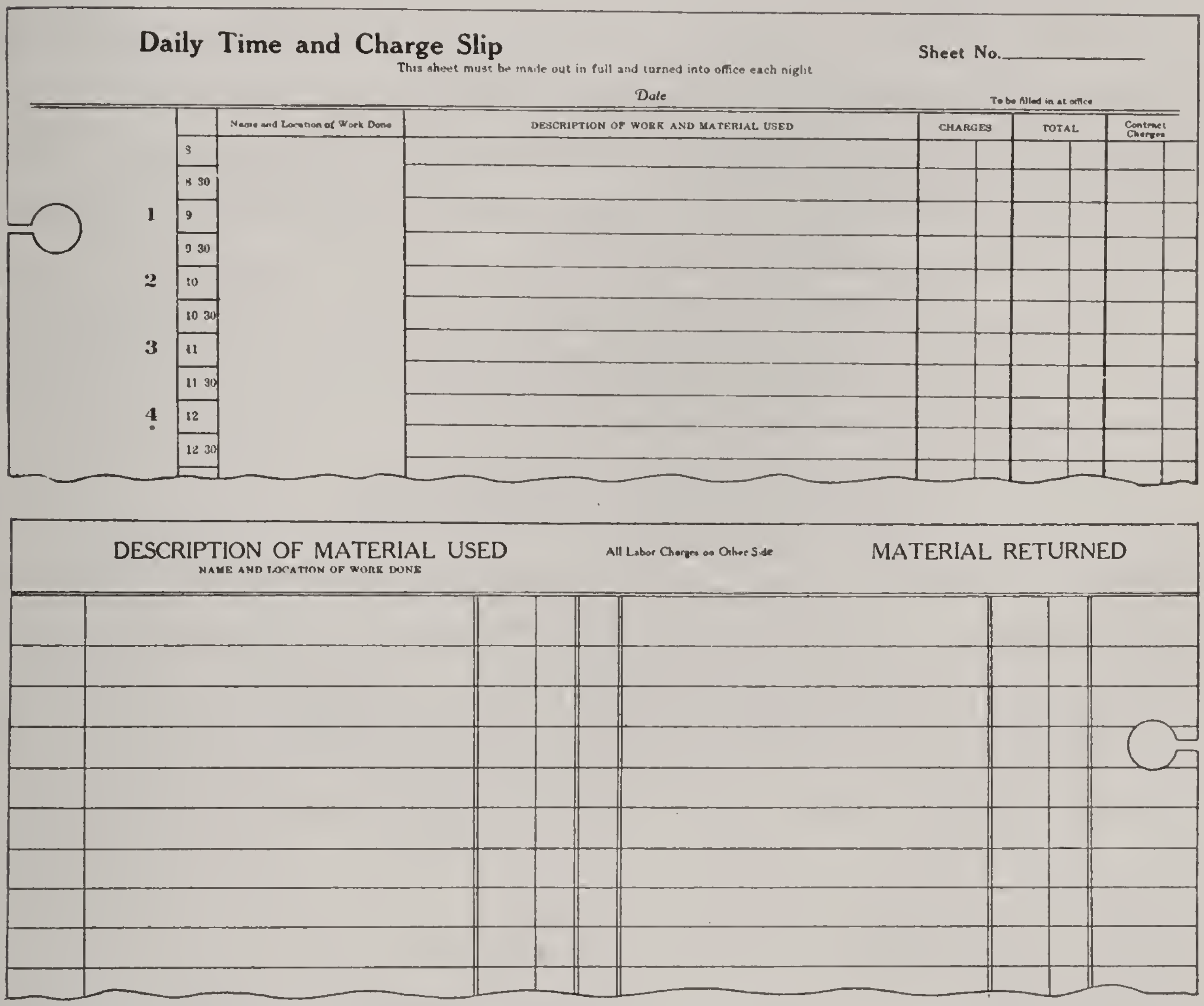
Business building culminating in the establishment of a successful organization through the institution of a definite method of cost computing on a productive labor basis is exemplified rather forcefully in the case of George F. Reeke, of Green Bay, Wis., a progressive master plumber and recognized leader in association circles. The features embodied in Mr. Reeke's efficient cost system have been evolved after eight years of close study relative to conditions and methods prevailing in the plumbing and heating fields, and the adoption of the good points discovered has resulted in the development of a paying business.

In the cost system that has been maintained with maximum efficiency there is but one combination time and charge sheet used and two books—cash journal and ledger.

The daily time and charge slip shown in the accompanying illustration is used for both day and contract work. At the left side provision is made whereby a complete record can be kept regarding the workman's activities throughout the day to within a half hour. Then the second column has to be filled in by the workman with the name of the customer and location of the job. The large centre space is used for giving a full description of the work undertaken and the amount of material used. The last three columns relate to price, and when the charges are finally totaled comparison can be made with the contract price entered in the final column. All of the slips are made out in full daily and turned in to the office each night. For reference purposes each slip is given a file number, which is entered at the top beside the wording "Sheet No."

At the bottom of the sheet the workman is reminded to state accurately as to whether his work is day or contract. The back of the sheet is used only when there is not sufficient space on the face side. Provision is made here for entering description of material used and returned.

When these slips are turned in at night they are entered and filed away numerically in a loose leaf system, the number of the slip being entered in the ledger so that the slip can be referred to whenever necessary. On contract work a special book is used and the cost of labor, productive and non-productive, material and other items are entered under separate heads. The estimated costs on these particular phases of the work are kept and comparison made with the estimate on completion of the contract.



Daily Time and Charge Slip

Sheet No.__________

This sheet must be made out in full and turned into office each night

Date

To be filled in at office

		Name and Location of Work Done	DESCRIPTION OF WORK AND MATERIAL USED	CHARGES	TOTAL	Contract Charges
	8					
	8 30					
1	9					
	9 30					
2	10					
	10 30					
3	11					
	11 30					
4	12					
	12 30					

DESCRIPTION OF MATERIAL USED

NAME AND LOCATION OF WORK DONE

All Labor Charges on Other Side

MATERIAL RETURNED

Workman's Daily Time and Charge Slip—Obverse and Reverse Sides

This constitutes the working of Mr. Reeke's system and its simplicity is apparent. In keeping the overhead costs, however, he pays careful attention to every detail. The cash journal in which these items are kept is divided into three parts, all under one cover. These are the general account, or overhead expenses, creditors' and customers' ledgers.

In the overhead expense section separate sheets are retained for each of the following items: Productive labor, non-productive labor, merchandise, freight, horse, general expense, equipment, repairs and replacing, interest and discount, insurance, bills payable, stock account, money due from customers, bills payable to creditors, association expenses, sales, building and loan, loss and gain, salary.

Under some of these heads several items are bunched, and for general information every item considered is given in the following table:

OVERHEAD CHARGES

Salary
Telephone
Water
Car fares
Bad accounts
Non-productive
Plumbers' labor
Doing work over
Horse feed
Repairs to harness and wagon
Association dues
Donations
Plumbers' licenses
Rent and heat
Bookkeeper
Taxes
Cartage
Driver
Replacing defective goods
Allowances on bills
Interest on capital
Good-fellowship
Depreciation
Incidentals
Light
Insurance
Replacement of tools and equipment
Collection expense and lawyer
Estimated cost of waste materials
Horseshoeing
Stationery, postage and printing
Advertising
Tickets to Entertainments

By this it will be seen that thirty-four items enter into the overhead charges, and it is Mr. Reeke's firm opinion that all expenditures are amply taken care of under these heads.

On the consideration of overhead expenses Mr. Reeke advises as follows: "Anyone doing a strictly plumbing business is justified in figuring his costs on his total sales, but if he is doing heating also and handles remunerative side lines such as vacuum cleaners, water heaters, etc., the proper method for figuring costs should be on the total amount of expenses incurred on productive labor only. By dividing the cost of productive labor into the overhead expense you get your percentage. Recently I had occasion to look over a business amounting in volume to $28,000, in which the total productive labor amounted to $6,303, and the total expenses to $3,869.

By dividing the productive labor into the overhead expense you arrive at a percentage of 61.3, which added to the cost of plumbers labor, either by the hour or day, would give your actual cost of sending out that class of labor. Of course, on to this you would have to add your percentage of profit. I have found by actual experience that this is an accurate method of figuring costs. When charging overhead expenses on the total sales I have calculated that the lowest percentage to be charged is 18.7, and on a combined cost of material and productive labor basis a 23.8 percentage is the lowest average to be considered.

ESTIMATING ON HEATING CONTRACTS

Methods Used by a Successful Steam Fitter in Calculating Cost of Heating Systems for Houses of Average Size

The plan followed by a successful steam fitter, who has the reputation of knowing as closely as is commercially practicable, what a heating job is going to cost him before he undertakes it is given herein.

This steam fitter has a pad of estimate blanks similar to that shown in one of the accompanying illustrations. Blanks similar to this may be procured from any boiler manufacturer free of charge.

After examining the plans carefully which were drawn to scale, this contractor wrote down in the first column a list of the rooms which were to be heated. He next took off the measurements of the rooms and placed these dimensions in their proper columns. As these plans were drawn to a scale of ¼ inch to 1 foot, that is ¼ inch on the blueprint indicating 1 foot of actual measurement in the room, he had no difficulty in arriving at the dimensions of the room.

With the living room on the first floor of the accompanying plan, it was found by adding the full width of the room to the length and the wall on the porch, that there was a total of 44 linear feet exposed to the weather. This multiplied by the height of the room, that is 44 x 9, gave a total exposed wall and glass surface of 396 square feet. It was also found that the four windows of the dimensions given on the plans gave a total of 68 square feet of glass surface. When the total glass surface was subtracted from the total wall surface, it was found that there were 328 square feet net of exposed wall. This figure was put down in the column headed "Net Wall Exposure" and the glass exposure was placed in its proper column.

System
Date
Owner
Location
Points of Compass
Height of Cellar
Flue
Architect
General Contractor
No. 1

Rooms	Wide	Long	High	Net Wall Exposure	Glass Exposure	Contents Cu. Ft.	Total B.T.U. to be Heated	Sq. Ft. Figured	Radiators Required						Remarks
									Sq. Feet	No. Rads.	No. Sect.	Style	Height	Valve	
Living Room	12	22	9	328	68	2376	15904	64	32 37⅓	1 1	12 14	2 col.	26"	1¼" 1¼"	E. S. & W. Exposures
Dining Room	13	12	9	186	39	1404	9141	36	40	1	15	"	26"	1¼"	North West
Den	11	8	9	140	30	792	6538	26	26⅔	1	10	"	26"	1¼"	South East
Pantry	9	6	9	38	16	486	2849	11	12	1	3	"	38"	1"	North
Hall	8	20	9	46	26	1440	5290	21	28	1	7	"	38"	1¼"	West
Second Floor															
Hall	8	14	8^{6}	—	—	952	1428	6							no exposure
Front Chamber	14	10	8^{6}	147	57	1190	8570	34	34⅔	1	13	2 col.	26"	1¼"	S. W. & N. Exposure
Over Living Room	13	20	8^{6}	226	54	2210	12425	50	48	1	12	"	38"	1¼"	South East
Over Kitchen	14	16	8^{6}	212	54	1904	11686	46	44	1	11	"	38"	1¼"	North East
Bath	9	7	8^{6}	46	14	536	2914	12	16	1	4	"	38"	1"	North
									318⅔	sq. ft.					
										10	radiators				
									136#	2 col.	38"	steam	rad.		
									182⅔#	2 col.	26"	"	"		

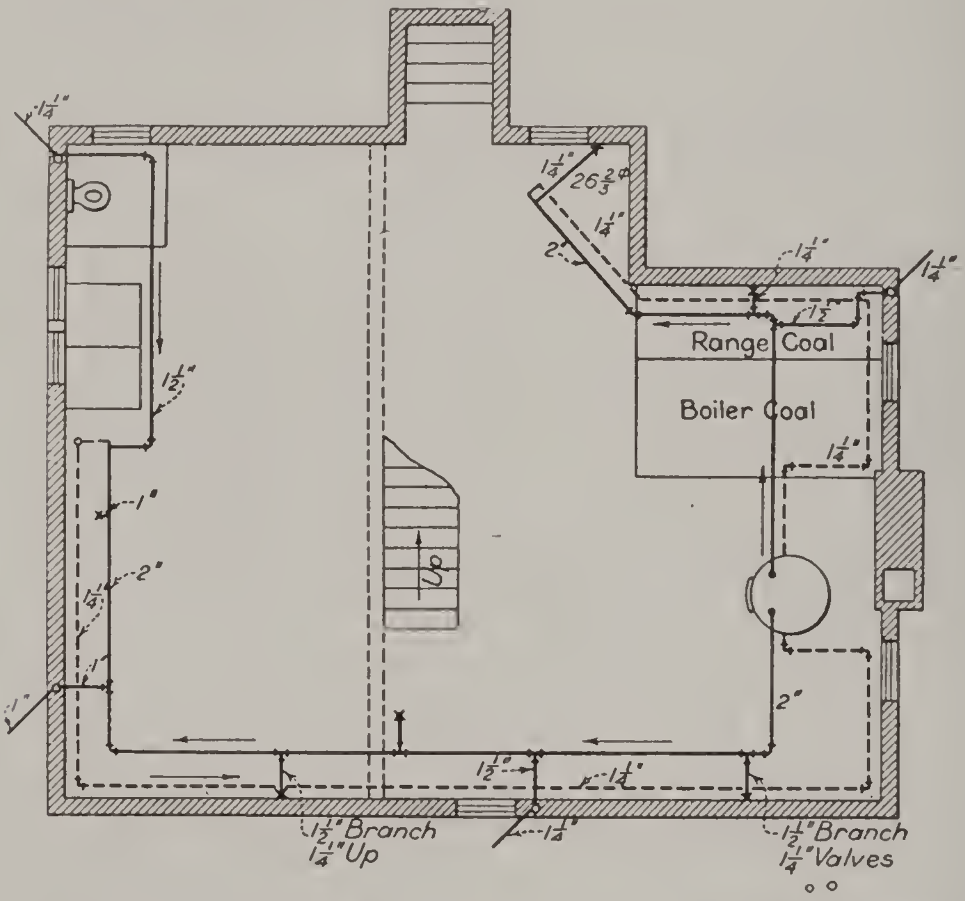
General Remarks

Estimate				
Quantity	Material	Price	Cost	
1	R. & B. Steam Boiler		72	49
	Sq. Ft. Steam or H. W. Rad. 1 col.			
318⅔	" " " " " " 2 "		60	87
	" " " " " " 3 "			
	" " " " " " 4 "			
	" " " " " " 5 "			
	" " " " " " Wall			
	" " " " " " Indirect			
	Bronzing Usually in the Painters contract			
	Pipes and Fittings		20	00
	½" valves and elbows			
	¾" " " "			
2	1" " " "		9	20
8	1¼" " " "			
	1½" " " "			
	2" " " "			
10	Automatic Air Valves		3	00
	Plates		2	00
	Covering		9	00
	Smoke Pipe		1	50
	Galv. Expansion Tank and Trimmings			
	Boiler Trimmings			
8 days	Labor @ $\$5.^{00}$		40	00
2 tons	Freight & Cartage		4	00
	Incidentals		6	00
	Total Cost		228	03
	Overhead, Expense and Net Profit 25%		57	00
			285	03

Estimate Blank Used by Progressive Steam Fitter in Making Up Bids

The next step was to find the cubical contents of the room by multiplying the width by the length by the height. This gave 2376 cubic feet for the living room and this result was placed in its proper column.

All the other rooms were treated in a similar manner and then calculations were made to determine the number of heat units which would have to be supplied to the various rooms to provide for heat losses through the exposed wall, windows and otherwise. The following data were used for these calculations:



Basement Plan Showing Symbols for Heating System

One square foot of wall surface will transmit 19 B.t.u. per hour and one square foot of glass surface will transmit 85 B.t.u. per hour and one cubic foot of space will lose 1.439 B.t.u. per hour. It is understood that these figures are for a frame house, well built and sheathed.

To obtain accurate results it would be necessary to multiply the absolute figures in the different columns by the figures or factors given in the foregoing. It is much easier and quicker, however, to multiply the exposed wall surface by 20, which is just one B.t.u. per hour more than

19; the glass by 85 and the cubic contents by 1.5. This last factor is taken to shorten the work which would be entailed by multiplying by 1.439. It will be found that these figures are accurate enough for ordinary purposes. They greatly facilitate the work of calculation.

In computing the B.t.u. necessary for the living room, the exposed wall surface of 328 square feet was multiplied by 20, the glass surface of 68 square feet by 85, and the cubic contents of 2376 cubic feet by 1.5. These three results totaled 15,904, the number of B.t.u. required for the living room per hour. This figure was noted in its proper column.

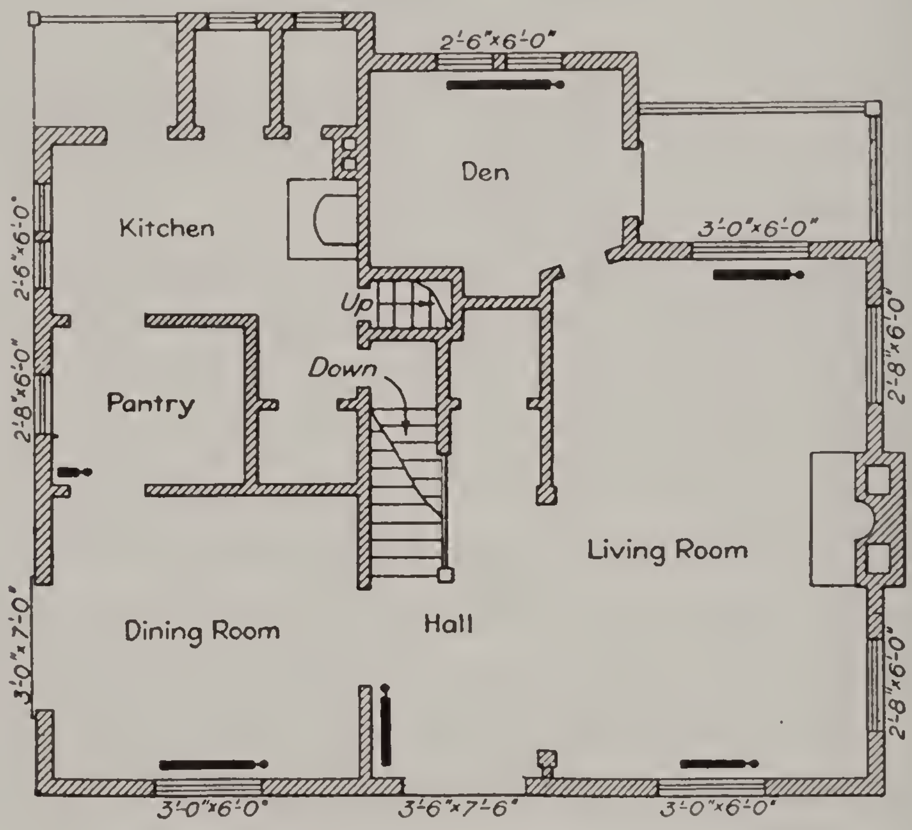
The next step was to find the size of radiator or radiators required for the living room. This was arrived at by using the following principles:

As one square foot of steam radiation gives off 250 B.t.u. per hour, the amount of radiation required for the living room was found by dividing 15,904, the total number of B.t.u. required for this room, by 250. The result obtained was 64 and accordingly it was known that a radiator of 64 square feet of surface would be required. As this room is used more frequently than most rooms in the ordinary run of houses, and as this particular one had a very cold exposed wall, the west, 10 per cent. was added to the amount of radiation figured. This brought the total size of the radiator up to 70 square feet for this particular room.

The next step was to determine the location of the radiators in the living room and as it seemed best to place these radiators under the windows, it was found that the space available under the window would allow a radiator only 26 inches high. From a radiator catalogue it was found that each section of a two-column radiator of this height would contain two and two-thirds square feet. It was, therefore, found by dividing the 70 by 2⅔ that 26 sections would give practically the surface exposed, that is all but one-third of a square foot and as the size of this radiator had been increased 10 per cent.

over usual calculations, it was decided not to add another section to get this third of a square foot. It was decided to place two radiators instead of one in the living room and naturally a larger radiator was used on the cold side of the room, the west, than on the warmer side. These radiators were finally proportioned as a 14-section radiator for the west side and a 12-section radiator for the east side.

Further reference to a radiator catalogue, all of which contain standard tappings, showed that the valves for these radiators should be of the one and one-quarter inch size.



Plan of First Floor

In arriving at the sizes of the radiators for the different rooms, the everyday use of the room was taken into consideration, as should always be the case, to know whether the radiator shall be of the absolute size as indicated by applying the foregoing principles or whether an additional allowance, as was made in the case of the living room, must be applied to insure absolute comfort.

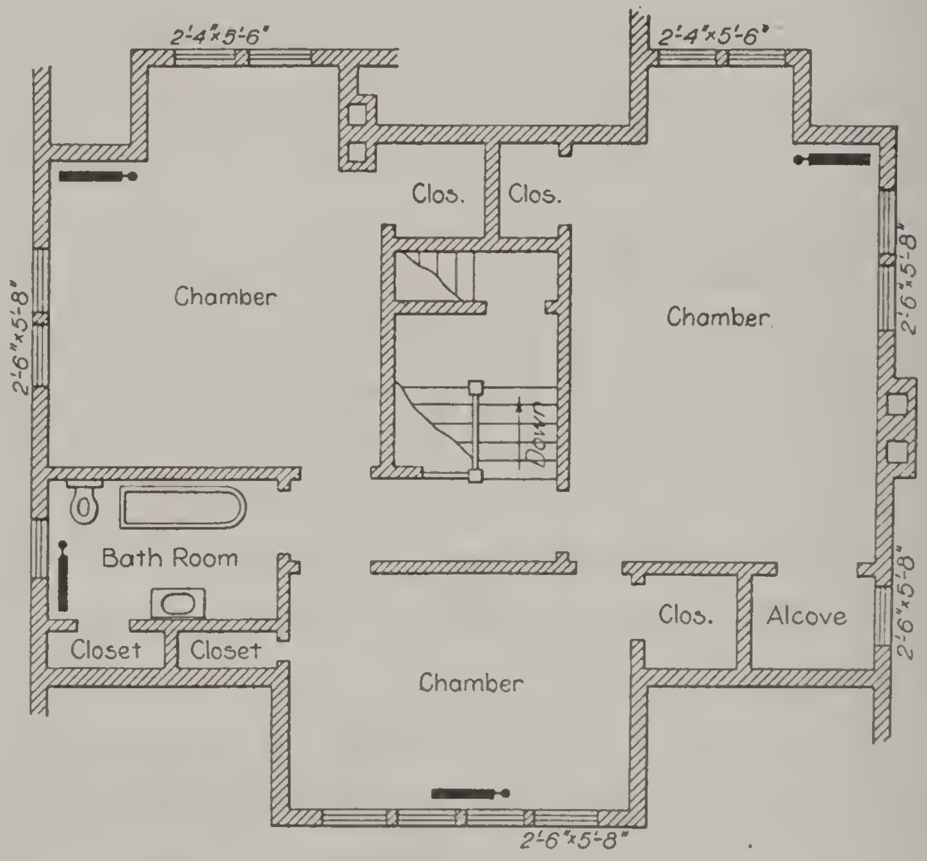
The plan followed by this steam fitter in making these allowances he explained as follows: The dining room is the first room used in the morning, and as a rule the radiator for it should be increased about 10 per cent. over the figures shown by applying the foregoing principles. Likewise, the radiation in the den should also be increased as this is a room used for lounging and the occupant usually discards outer garments when using it.

The pantry radiator, on the other hand, does not usually need to be very large as it is only necessary to keep the plumbing fixtures from freezing. The radiator in the pantry, as noted on the blank, has been increased materially for the reason that although a two-section radiator would be required according to calculations, such a radiator would not look well in this space. A wall radiator with less surface could have been used to overcome this objection.

The radiator in the hall on the first floor is usually planned to heat both the upper and lower halls but, owing to the height of the ceiling, it is customary to add about five per cent. to the calculations for such radiators. With the exception of the bath room, the radiators on the second floor need not be figured as liberally as those on the first floor. The bath room, however, should always be increased 10 per cent.

After the sizes of the radiators have been proportioned, the next step is to determine the size of the boiler to use. This is done by totaling the square feet of surface in the radiators, as noted in that special column and adding 50 per cent. to the total to get the boiler capacity in square feet. In this particular case the total square feet of the radiators was 318⅔. By adding 50 per cent. to this, it was found that a boiler of about 500 square feet capacity was required.

The sizes of all the radiators and the boilers having been obtained, the next step was to take the cellar plan and trace it on a piece of tracing paper. The location of the radiators on the first floor and the risers for the second floor was marked on this. A cross was used to locate the first floor radiators and a dot or small circle for the risers. The mains were then laid out in such a way as to reach all connections with the least amount of pipe, avoiding turns and angles as much as possible. After the mains and the returns were laid out the sizes were computed. This steam fitter remarked that he always uses liberal sizes. The majority of boiler catalogues have tables of sizes for mains and branches. He stated that these should not be depended on always as some of them are not reliable and a certain size of pipe for the limit allowed in these tables should not be used as a rule.



Plan of Second Floor

He further explained that if the radiators are all small and an unusual number of connections taken from a certain size main, the main should be increased one size. After the sizes are marked on the plan, it is an easy matter to measure up the pipe required with a rule.

The next step was to obtain the cost. The various items required were listed in the estimate blank as shown. The first item to be put down was one Richardson & Boynton boiler. Then followed the amount of radiation required. It might be explained at this point that the figures given in this particular estimate have been changed somewhat from the original and prices given here are only to be taken as examples and not as indicating the actual cost.

It is an easy matter to compute the cost of the pipe and the fittings after the list has once been made up. This steam fitter has established a rule of adding 30 per cent. to the cost of the pipe for the cost of the fittings. The cost of the valves, of course, is known and can be listed accordingly, as can also the plates and the smoke-pipe. The cost of the pipe covering can be computed by measuring the pipes and fittings.

However, this steam fitter has stated that where it is absolutely necessary to make up an estimate in a hurry and there is no time to make a layout of the job, he usually takes six per cent. of the amount of radiation in square feet on the job to cover the cost of the pipe and fittings, and 40 per cent. of the cost of pipe and fittings to cover the cost of pipe covering. These figures, of course, he explained, vary according to the size of the job and shape of the building and location of the radiators, but usually do not vary over four per cent. Experience, of course, will soon teach a man to figure very closely. This steam fitter, however, emphasized that it is always better to make a lay-out of the work.

In arriving at the cost of labor, the contractor goes on the plan that a good mechanic and helper usually pipe an ordinary steam job at the rate of three-quarters of a day per radiator. This includes covering but does not include bronzing. Where a steam fitter does the bronzing he can usually count on from two to three cents per square foot for the priming or first coat and one coat of bronze.

Where freight is paid by the manufacturer, it is only necessary to figure on the cartage. Radiation weighs about seven pounds per square foot and the average boiler will weigh from three to four pounds per square foot of rating. The weights of the pipe and fittings can be found in any jobber's catalogue with the total weight computed and the cost of cartage can readily be ascertained.

It is customary to add about two per cent. of the amount of radiation for incidentals. In this case only $6, however, is allowed.

After the cost had been made up, the next point was to determine just how much should be included in the bid to cover overhead expense and how much should be included for profit. As explained in the foregoing, the figures in this estimate blank are only used as examples. Let it be supposed that this steam fitter had an extremely low cost of doing business and that his overhead expense figured 10 per cent. on the total amount of business done for the year. Let it also be supposed that he was satisfied with 10 per cent. profit. This would mean that his cost of doing business plus his profit on this job would amount to 20 per cent. of his invoice. On this basis then his invoice would be made up of 80 per cent. cost of materials, labor and the like, and 20 per cent. overhead expense and profit. From the estimate it will be seen that the total cost was $228.03. This then was 80 per cent. of the total estimate which he intended to hand in. Knowing the amount of 80 per cent. of the bid it was an easy matter to calculate what the total or 100 per cent. of the estimate would be. It was found to be $285.03.

After the amount of the bid has been determined, the proposal should be made out and many boiler manufacturers furnish blank forms of specifications and proposals for their customers for use in this work.

BUSINESS METHODS FOR STEAM FITTING SHOPS

Simple Forms to Prevent Losses Through Negligence of Employees and Save Time and Labor in the Office

Every steam fitting business can be divided into three parts—buying, storage of goods and selling. The difference between the cost of buying, storing and selling—and what is received—is profit (or loss). To this extent the steam fitting business is not unlike any other. Grocers carry on business in the same way. A hardware store or a plumbing shop is similar, in fact, all business is very much alike—having the same characteristics—similar tendencies—like conditions.

As much money is lost each year by imperfect business methods as by inefficient salesmanship. Yet this is a point not generally recognized by the steam fitting trade at large, for frequently methods employed by steam fitters are so inadequate that there is a considerable percentage of waste—leakage caused by poor business methods.

As an illustration: A steam fitting business in a city of about 60,000 recently changed hands, or, more correctly, the proprietor, failing to make a satisfactory profit, became discouraged and turned his business over to a manager. The new manager, a young man with general business experience but no particular knowledge of steam fitting, knew to start with that the business was not profitable; here was "effect," so he dug into matters to see if he could discover "cause."

Upon looking over the books he was astonished to see what a large amount of work had been done by the concern. A large staff of steam fitters had been employed the year around and there seemed no reason why the business shouldn't pay.

Then he visited the shop, located a few blocks away from the office, with the idea of making a systematic inventory of the stock. Four men were employed in the shop. The new manager began to question them and found they were kept there to fill orders from stock. After watching conditions a few days he instituted a new system of filling orders and keeping up stock so efficient

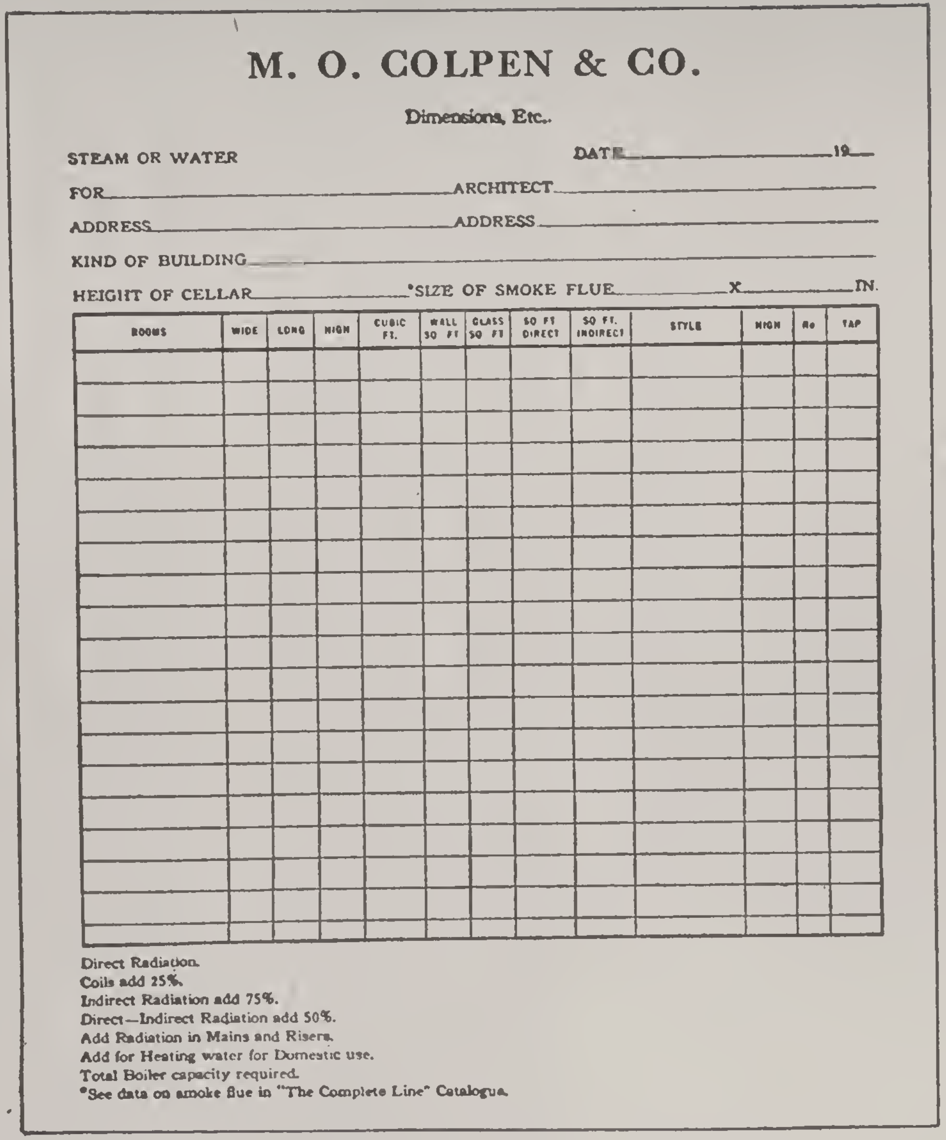
M. O. COLPEN & CO.

Estimate

STEAM
WATER

QUAN.	ITEMS	PRICE
....	No........Style..............U. S. Boiler } Water Steam Capacity........	
....	Asbestos cement to cover Boiler	
....	Boxing Charges	
....	Radiators	
....	Sq. ft.................Style.................in. high, @	
....	" .... " .... " @	
....	" .... " .... " @	
....	" .... " .... " @	
....	" .... " .... " @	
....	" .... " .... " @	
....	Radiator Valves..............................Style @	
....	Union Ells	
....	Automatic Air Valve........Style	
....	Key Air Valves	
....	Globe Valves	
....	Gate Valves	
....	Floor and Ceiling Plates and Hangers	
....	Pipe and Fittings	
....	Pipe Covering	
....	Bronzing	
....	Thermometer	
....	Altitude Gauge	
....	Expansion Tank	
....	Expansion Tank Bracket	
....	Honeywell Generator	
....	Registers	
....	Capitol Radiator Shields	
....	Cold Air Ducts	
....	Hot Air Ducts	
....	Persy Indirect Casings	
....	Radiator Boards	
....	Water Supply	
....	Blow Off Connections	
....	Smoke Pipe	
....	Foundation	
....	Freight	
....	Cartage	
....	Board	
....	Carfares and Incidentals	
....	Labor	
....	Total Net Cost	
....		
....	Profit	
....	Amount of Bid	

Fig. 1—Sheet to Avoid Omission of Material in Estimating



M. O. COLPEN & CO.

Dimensions, Etc.

STEAM OR WATER DATE________19__

FOR________ARCHITECT________

ADDRESS________ADDRESS________

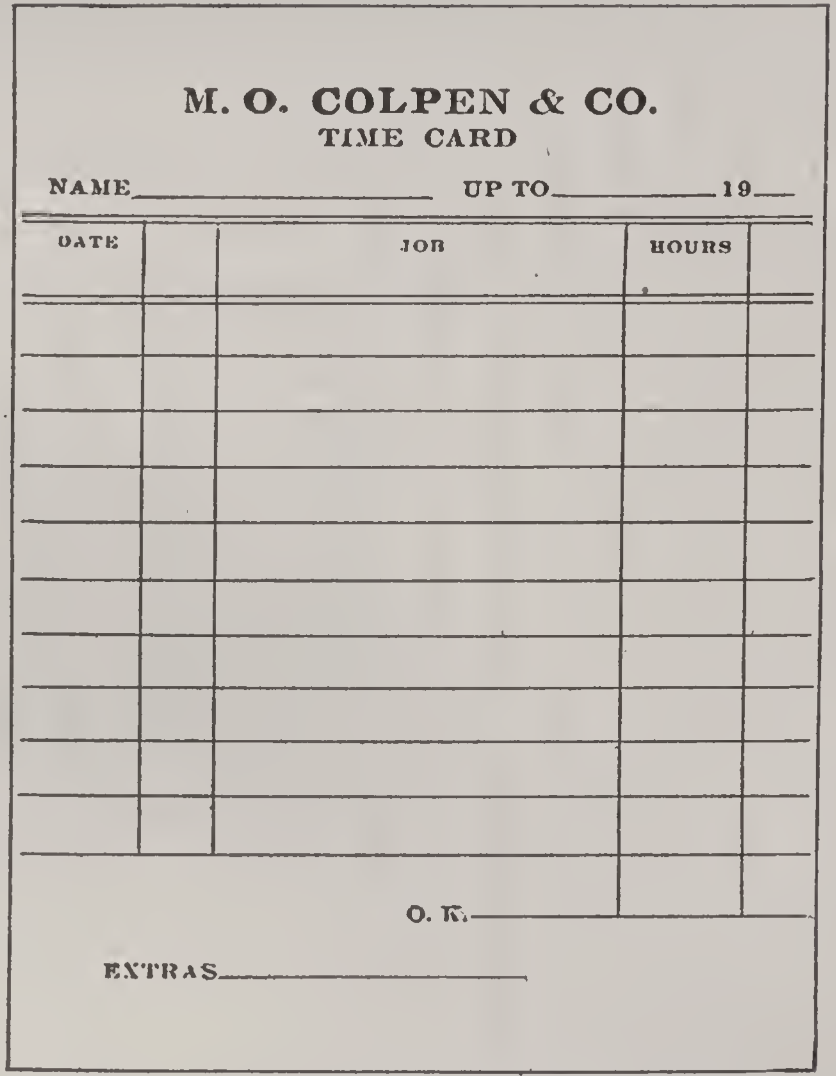
KIND OF BUILDING________

HEIGHT OF CELLAR________*SIZE OF SMOKE FLUE________X________IN.

ROOMS	WIDE	LONG	HIGH	CUBIC FT.	WALL SQ FT	GLASS SQ FT	SQ FT DIRECT	SQ FT. INDIRECT	STYLE	HIGH	No	TAP

Direct Radiation.
Coils add 25%.
Indirect Radiation add 75%.
Direct—Indirect Radiation add 50%.
Add Radiation in Mains and Risers.
Add for Heating water for Domestic use.
Total Boiler capacity required.
*See data on smoke flue in "The Complete Line" Catalogue.

Fig. 2—Form for Listing Radiation



M. O. COLPEN & CO.
TIME CARD

NAME________ UP TO________19__

DATE		JOB	HOURS	

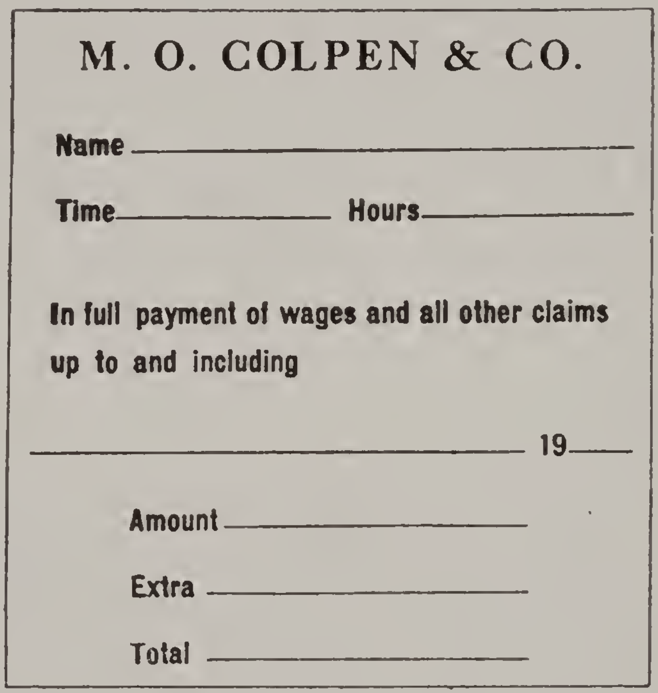
O. K.________

EXTRAS________

Fig. 3—Time Card Used by Workmen

that two men could handle the shop where it had formerly taken four. This resulted in a saving of $144 per month.

Next it was discovered that time could be saved by locating the shop nearer the railroad district (on account of an increasing out-of-town business). The next step was to contract with a local teaming company to do all the hauling for the concern at a saving of a considerable amount, and all the horses and wagons were sold to the teaming company. Other steps for increasing the efficiency of the organization were taken. Business forms and records were installed. Credit with supply houses was improved by making financial arrangements enabling the firm to pay bills promptly, in most instances taking the cash discount, and in less than two years this concern had the largest steam fitting business in that section of the state.


M. O. COLPEN & CO.

Name ____________________

Time __________ Hours __________

In full payment of wages and all other claims up to and including

____________________ 19____

Amount ____________

Extra ____________

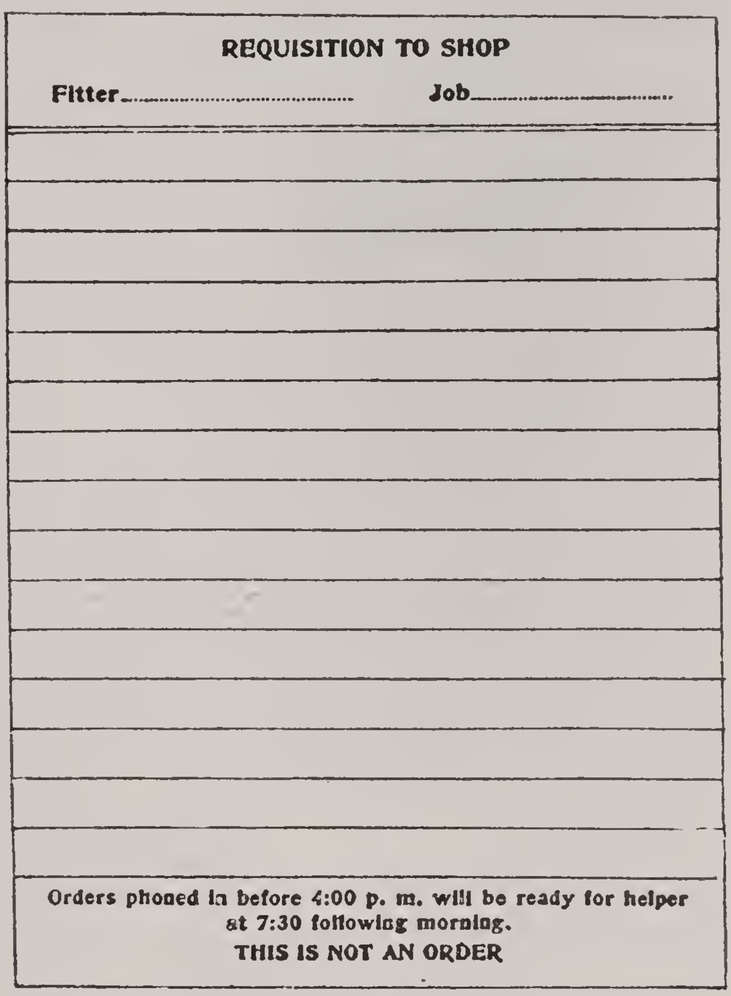
Total ____________

Fig. 4—Time Saving Pay Envelope

Usually the first record sheet which needs doctoring by an efficiency engineer is the Estimate Sheet. Probably as many leakages occur here as in any other department of business, for thumb-rule methods in connection with estimates frequently result in losses.

Every steam fitter should keep accurate accounts on the cost of every job. By keeping track of the cost of work in this way for a period of years, the contractor is able to average costs and prepare data which are invaluable in estimating. There is no guess work in this method; precise figures are possible and danger of error is largely eliminated.

An excellent form for an estimate sheet is illustrated in Fig. 1.



REQUISITION TO SHOP

Fitter................................ **Job**................................

Orders phoned in before 4:00 p. m. will be ready for helper at 7:30 following morning.

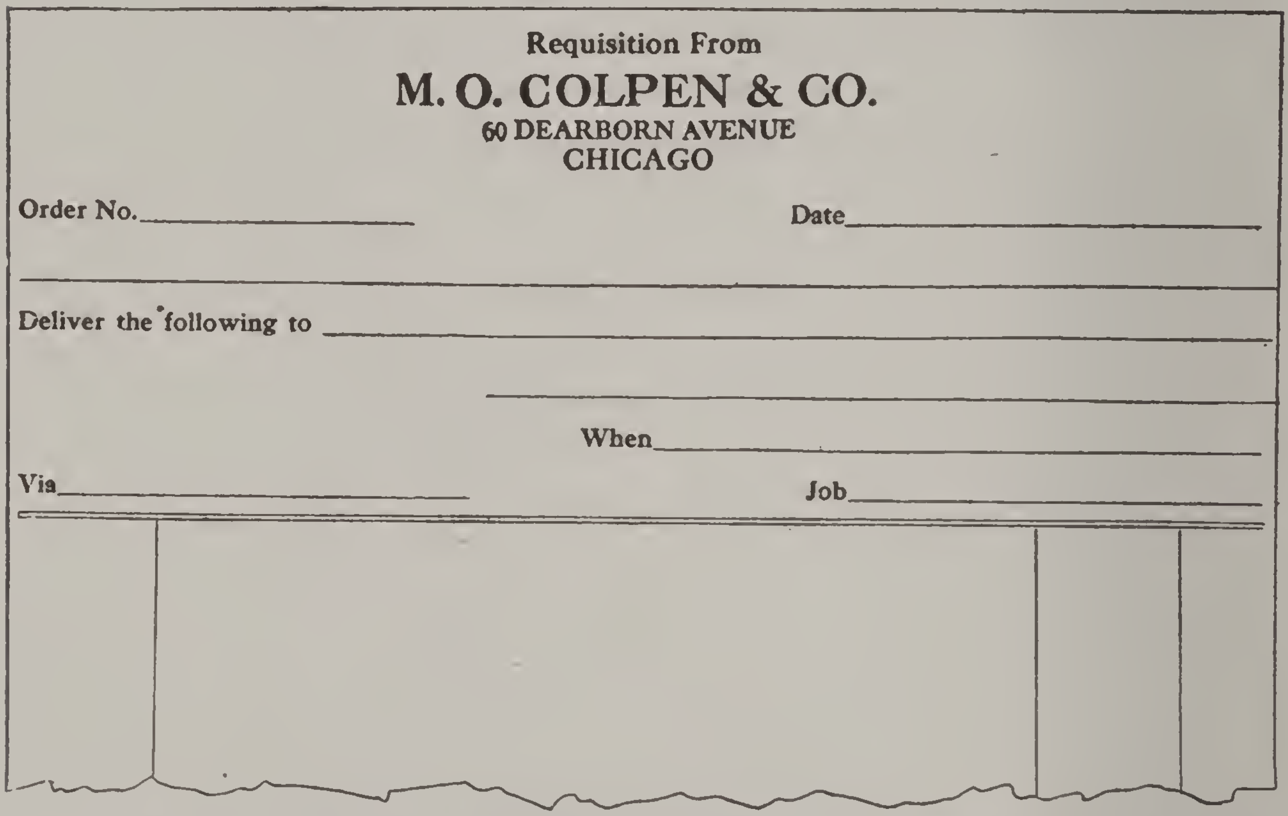
THIS IS NOT AN ORDER

Fig. 5—Form Used in Getting Material from Shop

After an estimate is entered on this form, it is filed away for future reference, an ordinary tender of bid being sent to the owner. The advantage of this is twofold; in the first place the estimate sheet itself, containing as it does an item for every possible branch of the business, serves as a memorandum to show that nothing in the estimate has been omitted. The second advantage is that a contractor, upon looking over back files, can tell at a glance just how much was figured for each item, so that when the job is completed and he has a record of what each item cost, he can quickly learn which items were not correctly estimated.

In the same manner the detail of radiator sizes shown in Fig. 2 will serve as a convenient check in ordering the material and as an aid to the men installing them.

An estimate form designed for one concern will not always serve as a correct model for another. Every business varies in regard to details, so it is usually necessary for each contractor to design his own forms. However, the principles are always the same—an estimate form should cover every item of the business—the estimate should be filled out with exact net costs—never with gross costs (including profit). After the cost has been estimated, the percentage of profit desired should be added and a bid sent in for the gross amount.



Requisition From

M. O. COLPEN & CO.

60 DEARBORN AVENUE

CHICAGO

Order No.________ Date________

Deliver the following to ________

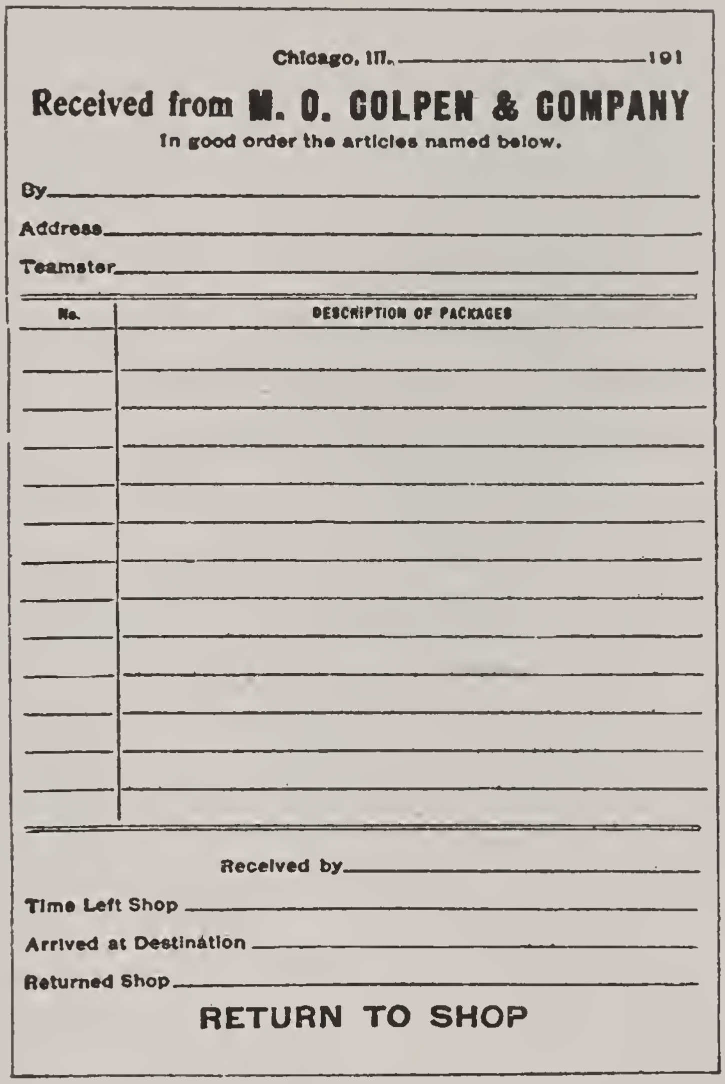
When________

Via________ Job________

Fig. 6—Material Ordered From Supply Houses is Accounted for by Using This Form in Duplicate

Many steam fitting contractors make the mistake of figuring estimates on a basis of gross cost (including profit). The disadvantage of this method is that in haggling with an owner or architect (which, unfortunately, frequently becomes necessary), the steam fitter, not knowing the net cost of the work, is unable to know just where he stands.

The daily or weekly time sheet is another means of leakage when scientifically-arranged records are not used. Old-fashioned time books are obsolete unless the contractor uses books especially designed for his own business. Loose or detachable leaf time cards are now considered to be the most convenient. These can be perforated sheets in book form, readily detached for filing, or separate cards may be issued. They are afterward turned in by the men and filed in ordinary card files. Fig. 3 shows a convenient form of time card reduced to the extreme of simplicity.



Chicago, Ill.________________191

Received from M. O. COLPEN & COMPANY

In good order the articles named below.

By________________

Address________________

Teamster________________

No.	DESCRIPTION OF PACKAGES

Received by________________

Time Left Shop________________

Arrived at Destination________________

Returned Shop________________

RETURN TO SHOP

Fig. 7—Teamsters Time Recording Delivery Form

In making up the pay roll most contractors use blank pay envelopes. A more efficient method is to have envelopes printed on the outside like Fig. 4, with the name of the concern, name of the workman, amount of time, date and sum which the envelope contains. A great advantage in this is the greater facility with which the payroll can be handled, and the reduction of liability of error. A second advantage is that each man, upon receiving his envelope, with the amount plainly recorded, knows at once how much is inside. If he wishes to dispute the amount he must do so immediately.

Workmen out on the job are frequently the cause of loss, owing to general inefficiency. There is loss of time in going back and forth from shop to job; loss of time by improper methods of doing the work; and loss of money through waste of material—especially the latter.

In the shop itself material is lost by reason of inefficient methods for storing it. Between the job and the shop there is every occasion for loss, when proper records are not kept. Men take material for use on jobs and the contractor never knows whether it is used or not.

An accurate record should be kept of goods taken away from the shop. The best way to handle this efficiently is to require workmen to use a requisition blank like Fig. 5 when they need material from the shop. This is filled out by the workman and sent to the shop, and after being filled the order is filed away for record. By means of a carbon copy which the workman keeps he also has a record of the goods ordered. A blank of this sort is not a general requisition by means of which workmen can get goods from supply houses.

A general requisition blank intended to be honored at supply houses should always be issued from the office. The practice of allowing mechanics to buy supplies as they see fit in most cases causes considerable loss during a year.

The general requisition blank illustrated on Fig. 6 is to be filled out in duplicate by means of a carbon. When goods not in the shop are wanted this requisition blank is filled out and sent to the supply house delivering the goods. The original is kept by the supply house, and the duplicate by the contractor.

Many steam fitting contractors have discovered that it is less expensive to have their hauling done by a teaming concern than it is to own and keep teams themselves. Of course, this condition does not exist in every town but in many there is no doubt that money can be saved by letting out the hauling by contract. The way this is usually done is to have a yearly contract for hauling between the steam fitter and the teaming concern, at so much per hour. Fig. 7 shows a good record form for automatically keeping account of the amount of time spent by teams in delivering the goods of the steam fitter. When a teamster calls at the shop for a load of goods he is handed this blank, which has been filled out by the foreman in charge.

Entered on the blank is a list of packages which he is to take. Recorded below is the time at which the load leaves the shop, at the top is the address to which the goods are to be hauled. When the load arrives at its destination one of the workmen signs for the goods, entering the time at which they arrived. If another load is to go back to the shop the teamster receives another record of time on his blank, when he arrives. The blanks, bound into a book with carbon and duplicate page under each blank, are simple and easy to use. The teamster keeps the duplicate, which is turned in to the office of the teaming concern where it becomes the basis on which the teaming bill is made out.

ESTIMATE BLANK FOR STEAM FITTERS

Form Devised to Include All Factors in Cost of Heating Plant

The results of the efforts of the joint conference committee appointed by the National Association of Master Plumbers and the National Association of Master Steam and Hot-Water Fitters in designing an estimate blank for the use of steam fitters is reproduced in the accompanying illustration.

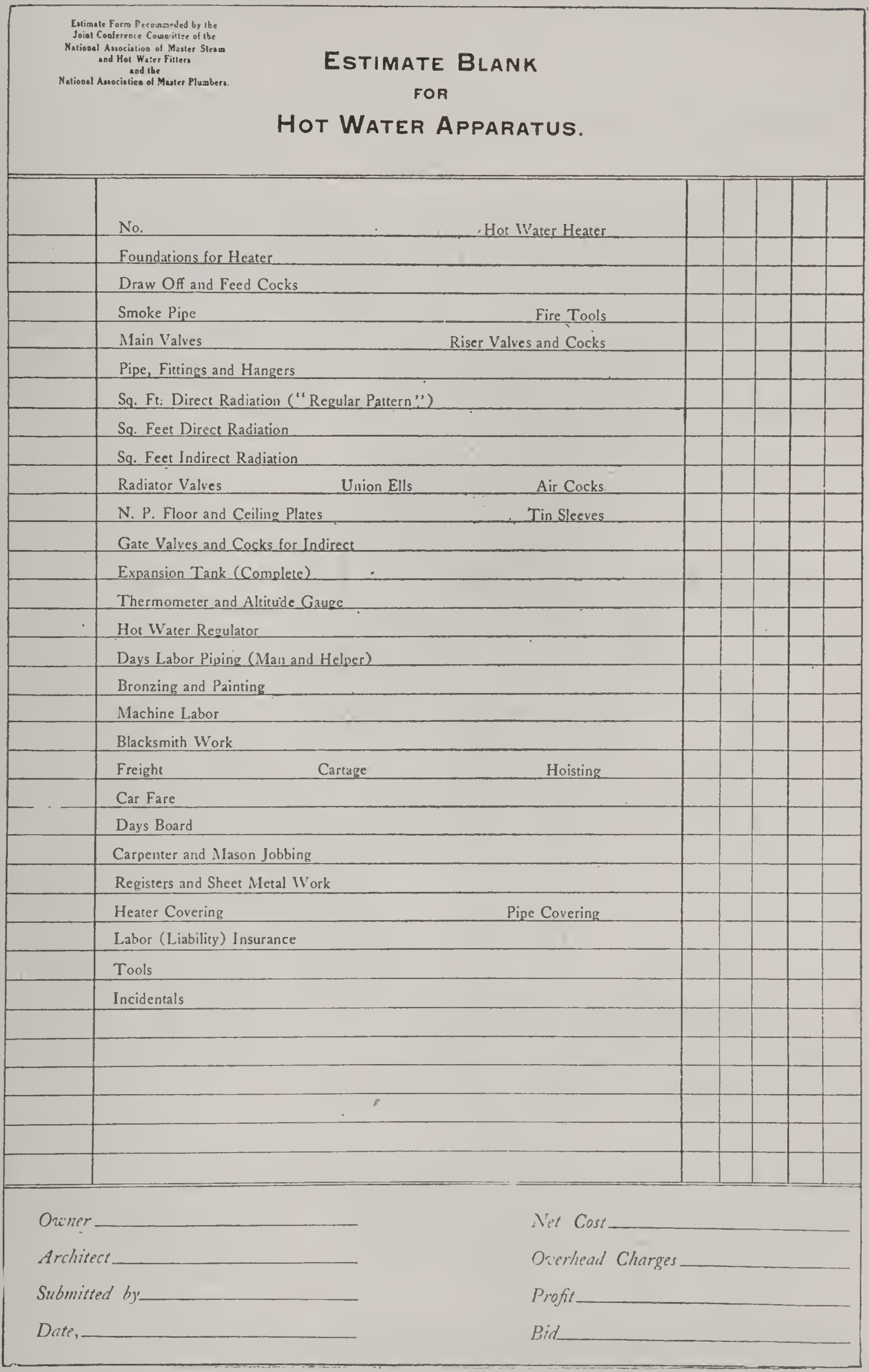
As explained in connection with the estimate blank for plumbers which was reproduced in these columns in the issue of June 27, the members of the committee aimed to get up a blank which would provide a space for setting down the cost of every item which enters into the erection of a heating system. In this way it is hoped to place in the hands of heating contractors a blank which will be a valuable guide in making up estimates as it is so arranged that the danger of omitting any item is reduced to a minimum.

The blank is conveniently ruled with columns in which may be extended the net cost of each item. The footing of these which will give the total net cost is supposed to be placed in the space set apart for that purpose. Immediately underneath there is a space for the overhead expense, then another for profit and finally a blank for the amount of the bid.

When the blank is filled in and the estimate submitted to the owner the sheet should be filed for future reference and comparison with the actual cost should the steam fitter using this blank get the contract.

These blanks were submitted as a part of the Joint Conference Committee report at an annual convention of the National Association of Master Plumbers held in Philadelphia.

Estimate Blank for Steam Fitters



Estimate Form Recommended by the
Joint Conference Committee of the
National Association of Master Steam
and Hot Water Fitters
and the
National Association of Master Plumbers.

ESTIMATE BLANK
FOR
HOT WATER APPARATUS.

No. Hot Water Heater
Foundations for Heater
Draw Off and Feed Cocks
Smoke Pipe Fire Tools
Main Valves Riser Valves and Cocks
Pipe, Fittings and Hangers
Sq. Ft. Direct Radiation ("Regular Pattern")
Sq. Feet Direct Radiation
Sq. Feet Indirect Radiation
Radiator Valves Union Ells Air Cocks
N. P. Floor and Ceiling Plates Tin Sleeves
Gate Valves and Cocks for Indirect
Expansion Tank (Complete)
Thermometer and Altitude Gauge
Hot Water Regulator
Days Labor Piping (Man and Helper)
Bronzing and Painting
Machine Labor
Blacksmith Work
Freight Cartage Hoisting
Car Fare
Days Board
Carpenter and Mason Jobbing
Registers and Sheet Metal Work
Heater Covering Pipe Covering
Labor (Liability) Insurance
Tools
Incidentals

Owner
Architect
Submitted by
Date,

Net Cost
Overhead Charges
Profit
Bid

Estimate Blank Designed for Use of Steam Fitters

ERECTING HEATING SYSTEMS WITHOUT PLANS

System of Measuring Connections, Positions, Riser Lengths and Other Parts Which Enables Fitter to Prepare Piping at Shop, Ship It Ready for Erection and Avoid Waste of Time and Material—A Simple Cost Keeping Sheet

"When my boys finish a heating job they bring home all the stock that is left with them on a street car." This was the astonishing statement made a short time ago by

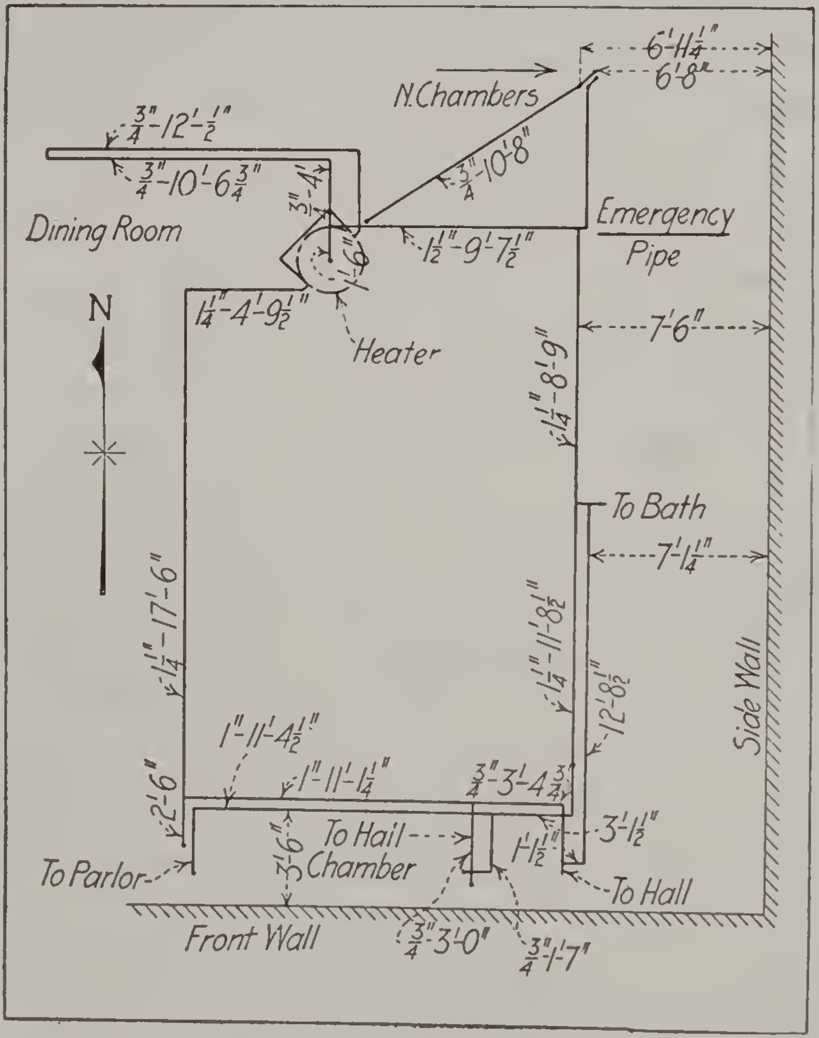
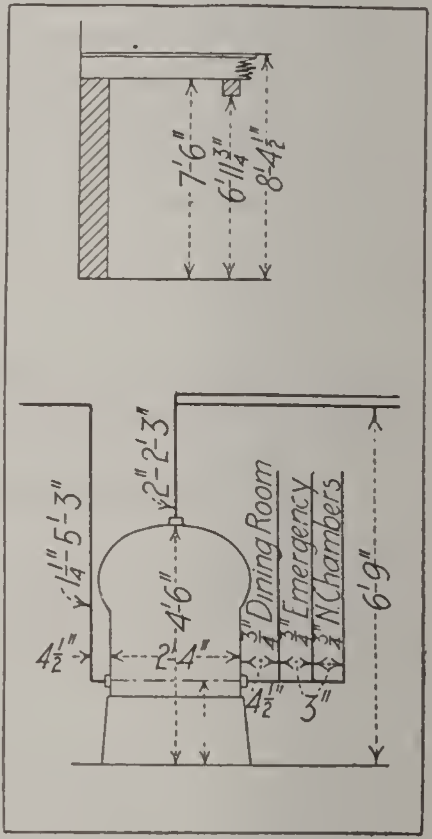


Fig. 1—Plan of Piping Made from Notes and Measurements from Two Fixed Points; in this Case, the Front and Side Walls



Figs. 2 and 3—Measurements for Pitch of Pipes and Connections to Boiler

a Massachusetts heating contractor of long experience, and having in mind the barrels and barrels of cast-iron fittings, lengths and half-lengths of pipe, vises, die stocks and other paraphernalia that usually accompany the steam fitter when he "wearily plods his homeward way"

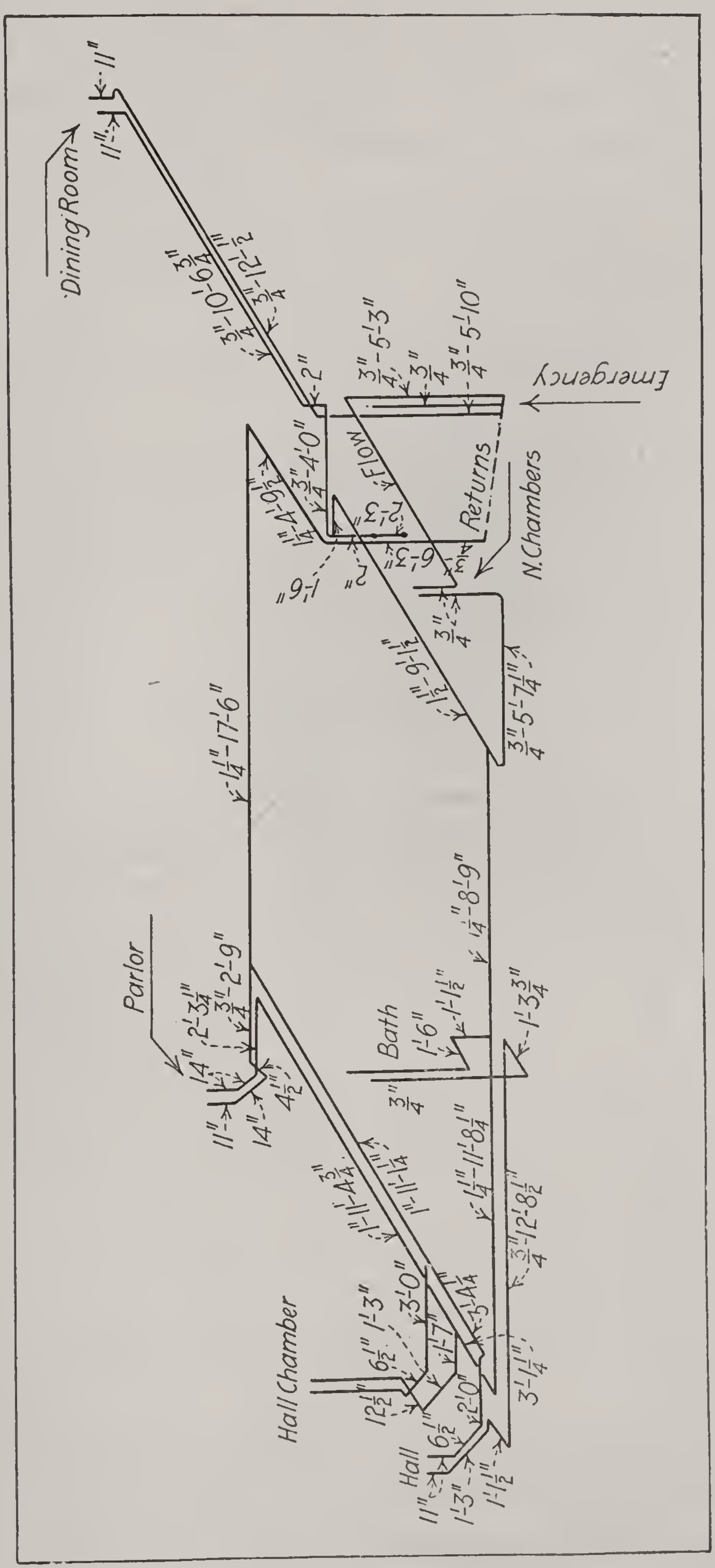


Fig. 4—Isometric Plan of Piping Constructed From Notes and Measurements Taken From Two Fixed Points

on completing a job of even moderate pretensions, the Experienced Contractor was put through a course of interrogation that must have brought into his mind visions of the Spanish Inquisition.

Having divulged, a little at a time, some most interesting information on the matter of installing hot-water heating plants with the minimum of fuss and the maximum of efficiency and profit, the Experienced Heating Contractor was finally induced to dig out from his files the records and data of one of his smaller jobs, so that readers of *Metal Worker, Plumber and Steam Fitter* who are interested in this line of work might learn of an ingenious system of carrying out work which makes the lady members of the household in which the plants are installed swear by the Experienced Contractor for ever more.

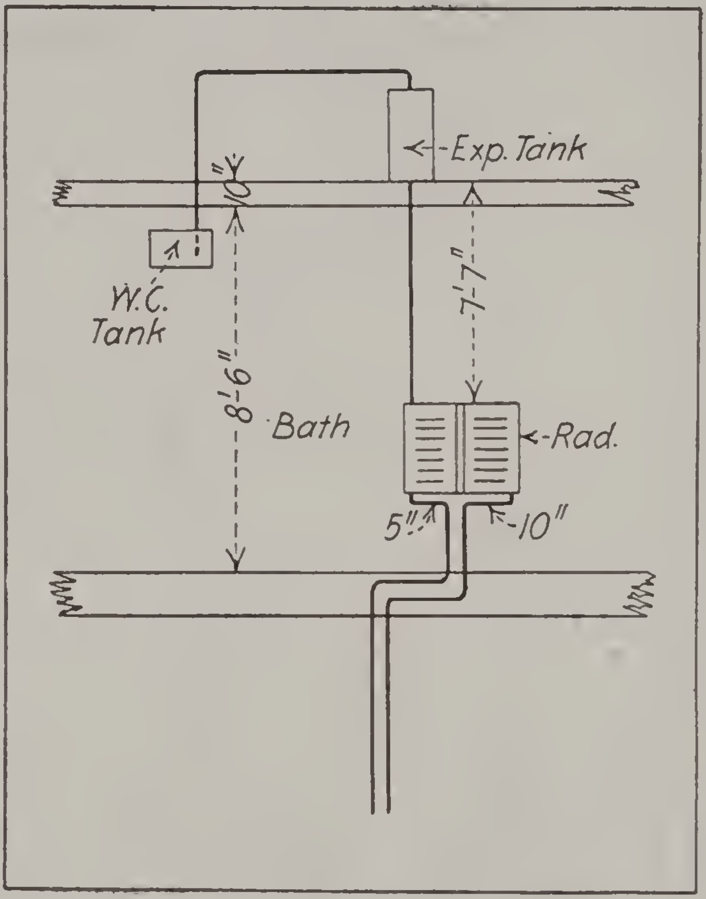
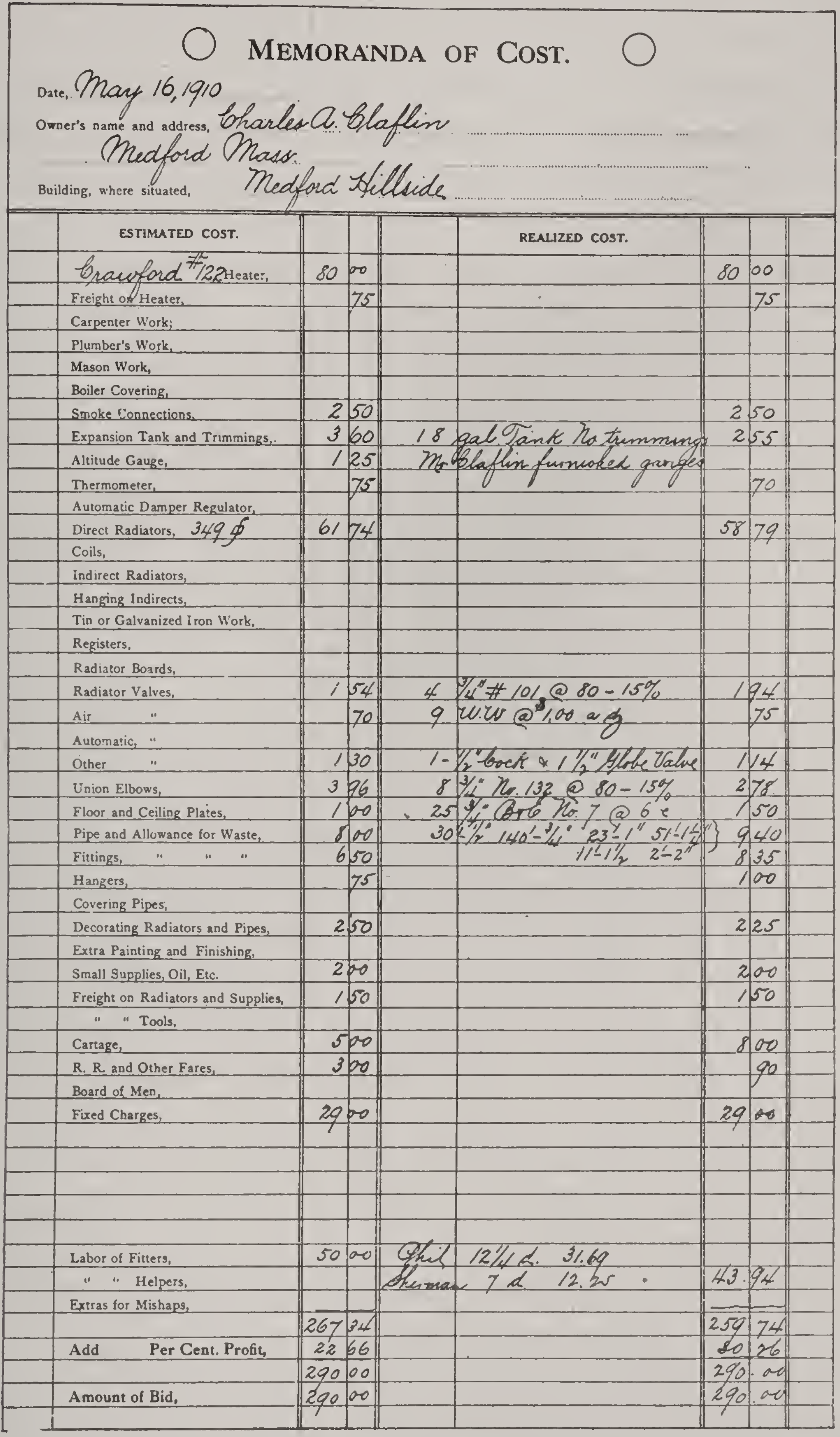


Fig. 5—Dimensions of Expansion Pipe and Radiator Connections

The first essential to the successful application of the idea is a thorough knowledge of the heating business. The second is the possession of some imagination, enough at least to enable the owner of it to see the job in his mind's eye as it will be when completed. If he possesses these two essentials he may proceed to lay out the system in the regular way, securing the proportions of his boiler,



○ **MEMORANDA OF COST.** ○

Date, May 16, 1910

Owner's name and address, Charles A. Claflin
Medford Mass.

Building, where situated, Medford Hillside

ESTIMATED COST.				REALIZED COST.		
Crawford #122 Heater,	80	00			80	00
Freight on Heater,		75				75
Carpenter Work;						
Plumber's Work,						
Mason Work,						
Boiler Covering,						
Smoke Connections,	2	50			2	50
Expansion Tank and Trimmings,	3	60	18	gal Tank No trimmings	2	55
Altitude Gauge,	1	25	Mr	Claflin furnished gauges		
Thermometer,		75				70
Automatic Damper Regulator,						
Direct Radiators, 349 □'	61	74			58	79
Coils,						
Indirect Radiators,						
Hanging Indirects,						
Tin or Galvanized Iron Work,						
Registers,						
Radiator Boards,						
Radiator Valves,	1	54	4	¾" # 101 @ 80 - 15%	1	94
Air "		70	9	W.W @ $1,00 a dz		75
Automatic, "						
Other "	1	30	1-	½" cock & 1½" Globe Valve	1	14
Union Elbows,	3	96	8	¾" No. 132 @ 80 - 15%	2	78
Floor and Ceiling Plates,	1	00	25	¾" Bro No. 7 @ 6 ¢	1	50
Pipe and Allowance for Waste,	8	00	30'	-½" 140'-¾" 23'-1" 51'-1¼" }	9	40
Fittings, " " "	6	50		11'-1½ 2'-2"	8	35
Hangers,		75			1	00
Covering Pipes,						
Decorating Radiators and Pipes,	2	50			2	25
Extra Painting and Finishing,						
Small Supplies, Oil, Etc.	2	00			2	00
Freight on Radiators and Supplies,	1	50			1	50
" " Tools,						
Cartage,	5	00			8	00
R. R. and Other Fares,	3	00				90
Board of Men,						
Fixed Charges,	29	00			29	00
Labor of Fitters,	50	00	Phil	12¼ d. 31.69		
" " Helpers,			Sherman	7 d. 12.25	43	94
Extras for Mishaps,						
	267	34			259	74
Add Per Cent. Profit,	22	66			~~20~~	26
	290	00			290	00
Amount of Bid,	290	00			290	00

Fig. 6—Convenient Estimate and Cost Sheet

mains, risers and radiation by any formula that may please him best.

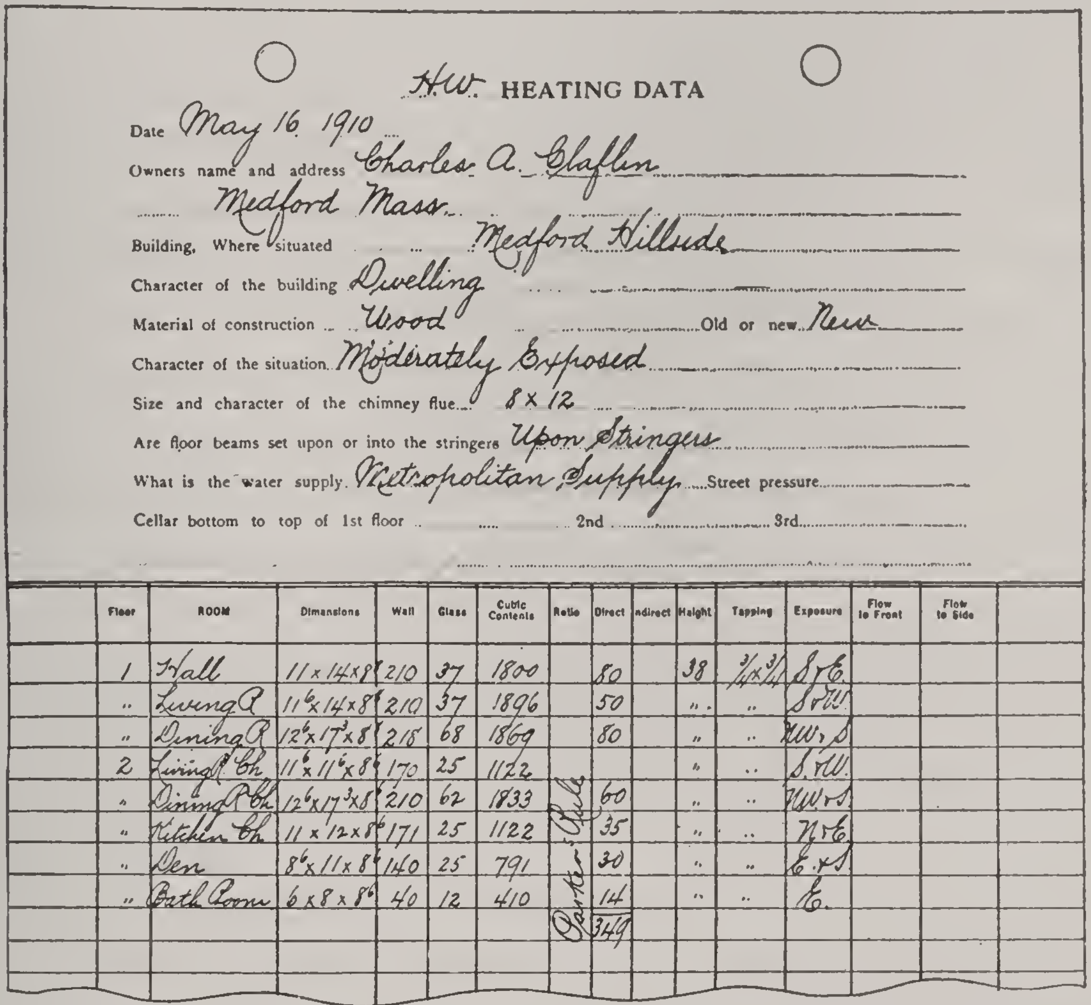
Then, when he has determined where the boiler will stand he decides where the radiators will be placed and where the risers will come through the various floors. This is where the knowledge of the trade is most useful for, to follow this system thoroughly, it is necessary to locate these exactly. Besides the knowledge, a steel tape and a "feeling bit" are required.

The feeling bit is used first to determine that the riser can be put through without any interference with other pipes, timbers or other obstructions. The experienced man will drill the hole a little to one side of the center of the ultimate hole so that when the fitter drills the holes for his risers the small hole made by the feeling bit will not prevent the expansive bit from taking hold.

There we are with all the holes drilled and nothing in the way to prevent the pipes being carried up when that part of the work is reached. The whole system is built upon the taking of measurements from certain definite points, so a string with a small plumb bob is dropped from the center of each riser center into the cellar in the first place. The position of the boiler is provisionally settled and the location of the flow and return mains made. These are measured from the front and side walls, as the measuring points decided upon, as shown in the plan in Fig. 1. There it will be seen that a good position for the flow pipe is three feet, six inches from the front wall and seven feet, one and one-quarter inches from the side wall.

The return pipe is equally easy to locate for it is intended to run it parallel with the flow pipe and the location of the risers makes this easily possible. Therefore, allow six inches as a sufficient space between them and then 17 feet, 6 inches to the point at the side of the boiler where the connection will be made and the position of the boiler is thereby definitely fixed. The full length of the main flow pipe to the front part of the house is just as easy to find and then the position of the various branch connections is marked off.

Now the steel tape is used as carefully as it possibly can be and the lengths of the various parts are found to a fraction of an inch. The distance from each riser to the main is then found and, as Captain Cuttle would say, "When found make a note of," so every measurement is carefull made a note of. The same procedure is followed with the connections for the dining room and the north chambers. The position of the water supply connection is also decided and measurements taken for the piping.



H.W. HEATING DATA

Date May 16 1910

Owners name and address Charles A. Claflin

Medford Mass.

Building, Where situated Medford Hillside

Character of the building Dwelling

Material of construction Wood Old or new New

Character of the situation Moderately Exposed

Size and character of the chimney flue 8 × 12

Are floor beams set upon or into the stringers Upon Stringers

What is the water supply Metropolitan Supply Street pressure

Cellar bottom to top of 1st floor 2nd 3rd

	Floor	ROOM	Dimensions	Wall	Glass	Cubic Contents	Ratio	Direct	Indirect	Height	Tapping	Exposure	Flow to Front	Flow to Side	
	1	Hall	$11 \times 14 \times 8^6$	210	37	1800		80		38	$\frac{3}{4} \times \frac{3}{4}$	S & E.			
	"	Living R	$11^6 \times 14 \times 8^6$	210	37	1896		50		"	"	S & W.			
	"	Dining R	$12^6 \times 17^3 \times 8^6$	218	68	1869		80		"	"	N.W. & S			
	2	Living R Ch.	$11^6 \times 11^6 \times 8^6$	170	25	1122				"	"	S. & W.			
	"	Dining R Ch.	$12^6 \times 17^3 \times 8^6$	210	62	1833	Carter's Rule	60		"	"	N.W. & S			
	"	Kitchen Ch.	$11 \times 12 \times 8^6$	171	25	1122		35		"	"	N & E.			
	"	Den	$8^6 \times 11 \times 8^6$	140	25	791		30		"	"	E & S			
	"	Bath Room	$6 \times 8 \times 8^6$	40	12	410		14		"	"	E.			
								349							

Fig. 7—A Convenient Record of Radiation and Other Data

Most men will make a rough sketch as they go along, locating the pipes and connections, as shown in the plan in Fig. 1. Let it be said here that this Experienced Contractor has got the business so thoroughly in hand that he can omit the sketches and rely entirely on his note book. It reads like this "Front wall to flow main. .front wall to parlor riser, flow. .return. .front wall to hall chamber riser, flow. .return. .front wall to hall, flow. . return. .front wall to boiler flow connection. .side wall to bath connection..side wall to bath flow connection..side wall to bath room riser, flow..side wall to north chamber riser, flow..return..'' and so on to the end.

Although the experienced man can rely entirely on his notes the beginner had better make sketches. When he has been as long at the game as the Experienced Contractor he can forget them if he likes. Meanwhile, see the little sketch in Fig. 2. This is how the correct riser heights are obtained, for it shows how high the mains will have to be run in the cellar, and if there will be any offsets to be made to clear wall heads or joists.

Then there is another diagram in Fig. 3, which shows the boiler connections and the fact that two of the return connections are to be brought in at one side and one at the other. On it are marked the heights of the flow and return main connections from the floor.

The full layout of the job is seen in the isometric drawing in Fig. 4, and this shows exactly how much the pipes will have to rise to clear the stone wall and get back far enough to reach the position they will occupy as risers to the upper floors.

Incidentally the layout may seem peculiar in some respects, as it will be seen that the flow connection to the north chamber radiators is taken from the bottom of the pipe, that the return from the bath room radiator takes the longest way round instead of proceeding directly back to the boiler, and that after it does commence on its return path it takes a seemingly unaccountable turn and becomes a supply pipe for the hall radiator. The system in other parts is equally puzzling. It has that ''different'' touch which lends additional interest to the question but if a little study is given to it the reason soon becomes apparent. Every thing that is done has a meaning and the whole spells balance and equalization of the flow. It works.

As the connections to the radiators are regular, little difficulty is experienced in getting the measurements of the risers and the short pieces that will be required to connect them to the radiator valves. The connection to the expansion tank, as shown in Fig. 5, may not be acceptable to the steam fitter who is going to try this method of measuring up his work. Any other connection will suit, but this shows the idea of a man who believes that air should be relieved from a system without blowing any of the water out of the radiators first, which is beside the point again.

Got all these measurements down in your book? Take them home. Make up your estimate and if you do not now use an estimate blank study the one reproduced in Fig. 6 very carefully. The first thing noticeable is that it contains two columns, one of which is filled up for the purpose of submitting an estimate. The items are supposed to be all in your notebook and you are supposed to have seen the job clearly enough to come very close to the exact amount of material required. Notice the little items that are included and which the average contractor forgets. Notice that even our Experienced Contractor did not allow as much for some things as he should have done, for instance, fittings.

Nevertheless he averaged up very well in the end and if he did omit to include the amount of pipe required for one riser or so, that was his own fault rather than that of his system. Note also that he included a fixed charge of $29 for overhead expenses. This works out at about 10 per cent., which is less than the average, but in his case very nearly correct. In any case the estimate is submitted and the job is commenced.

Then another essential is seen to be in the program. The fitter needs a lawn or a yard behind his premises for he now proceeds to erect the system there. This is where the basement heating contractor has to give up the idea of following this system out but where his luckier competitor who can command this necessary space has the advantage. Pegs are driven into the ground to represent the boiler center and the measuring points and from these, with the aid of the note book and the steel tape the riser positions and connections to the mains are accurately laid out.

The boys begin to cut and thread pipe and before you are aware of it the flow and return mains are run and the riser connections made. Up go the risers to the first floor at least, caps are put on and the system is tested out by a pump or the city pressure.

Now for the paint pot and the brush. Mark the pipes and fittings 1, 1A, 1B, 1C, and so on, and the parts are ready for shipment. A few, very few, spares are taken along, wrenches, bronze and pipe cement complete the assortment and the radiators and boiler are shipped direct.

The boys reach the job, drill the holes for the risers and sweep up the chips. The boiler is set, the mains are run with little trouble, the risers are dropped into position and connected and all is ready for the radiators. There is no noise, no pounding, pulling and hauling in the cellar, no oil, chips and dirt to drag through the house from the pipe threading bench when the helper takes a piece up stairs to put into position.

The job is installed, tested out, the radiators are decorated and all completed with the greatest facility and the women folks can't believe their eyes when they see the ''noisy, dirty steam fitters'' they expected to have with them for several weeks taking their departure. This is not at all too rosy. Anybody can do it who has a steel tape, brains and a backyard.

By the way the illustration in Fig. 7 is worth study also in connection with the estimate blank. This is a record of radiation and it is useful, not only for the job in question but also as a guide for further work in the same locality and with the same characteristics. If the job has proved satisfactory it will be known that the proportions were about right and that the formula used was reliable. If unsatisfactory it will help to make the estimating of the radiation and pipe sizes in the next job more dependable. The notes at the top of the page carry all of the information required and the figures show all the particulars about the radiators that are necessary in ordering, or for reference at a later time should another job of a similar nature be handled.

This is a system that has been worked out by a man who knows the heating business from every angle. It may not suit others as well as it does him, but if he or any other who may use it can go out and with the aid of a steel tape take measurements, bring them home, prepare every piece of pipe needed with the facilities enjoyed at the shop, ship them hundreds of miles and go off to install the work confident that there will be no trouble, no excess stock to ship back, no leaky joints to give trouble, and a reputation for speed, consideration for the comfort of others, efficiency and honesty to be added to every time, surely the system possesses features which should recommend it to the attention of every progressive heating contractor who can possibly put it into practice.

ESTIMATING ON SHEET METAL CONTRACTS

Necessities and Advantages of a Cost System with Examples Worked Out to Show Application to Sheet Metal Business

An instructive paper was presented by B. F. John, Philadelphia, Pa., at a meeting of the National Association of Sheet Metal Contractors at St. Louis, in 1912, in which he outlined a plan by which sheet metal contractors may make up an estimate with a proper allowance for the cost of doing business. Mr. John's presentation of this subject was as follows:

Before we consider the cost factor itself I am going to ask you to allow me to present to you the necessity for it, together with some raw facts as to our present method and to deviate from the main subject to illustrate my point: why the condition that confronts us is largely due to the absence of just such essentials as the "cost factor."

Certain men among us with experience gave wise counsel when they suggested the formation of our National Association as a means of success to a badly battered trade. Each year following some one has proposed some such essential business fact that would tend to make the National organization stronger and the local association better able to help the individual. Have we made use of them? One of these facts was to educate ourselves to become better competitors.

At each annual convention we hear of some such fact helpful to our business. Do we carry this fact back to our local organization and work on it with the attention and in the same manner in which we work upon an increase of expense requested by the convention?

PREVALENT ESSENTIALS OF NEW SHOP OWNERS

In my experience nearly every man who enters our trade possesses four business essentials, viz., a little capital, a certain amount of work he is sure he can control, a rosy outlook for the future and unlimited nerve or self-assurance. After a time the capital diminishes quickly; work seems harder to obtain; the future outlook seems dark, but if he is made of the right stuff his nerve remains, slightly shaken perhaps. At such a time this man is willing to listen to counsel of experience and if the counsel is good it develops the man into a fair competitor, but if not he is in a position to grasp at straws and become the tool of the wolves of our trade, the building broker, commonly called the contractor and builder, or the operative building shark.

The counsel of experience at this time should be the assistance of the local association. The literature and the aims of the local association should reach every individual in the trade with but few exceptions.

NECESSITY FOR AN EFFICIENT COST SYSTEM

I am going to try today to put before you a most important work for the local association; it requires some thought and study and patience to place it before your members and the trade, but there is nothing that will return more in dollars and cents than the adoption of a cost factor by the majority of the trade in your vicinity. You may decide this method correct or incorrect, but you cannot deny that such a factor is needed and badly, neither can you deny that by its use you can practically eliminate the price cutter and elevate your trade in the minds of your customer. I am going to try to lay the foundation on which one interested member in such local represented can build.

EVOLUTION OF COST SYSTEMS

The cost factor in business is not new; from the earliest days of manufacturing some sort of costs were in existence and from the work of one bookkeeper we now find a whole department in large organizations caring for this most important subject. No doubt some of you have cost systems which you were compelled to adopt by sheer necessity, and no doubt these systems differ, yet not one who has ever used such a factor would return to the old way. The ratio of the unsuccessful merchants who use a cost system is small when compared with the failures due to its absence.

Our local association during the past three years has considered this subject at intervals and sometimes whole meetings have been set aside for the consideration of this subject and its influence has been felt not only in better profits shown, but by satisfied members, and it is our purpose in the near future to put this subject in print for the use of the trade at large, for the selling price of some of the first-class jobs is absolutely disgusting. It is important, gentlemen, and no matter what system you use persist in it and the proper system with a little study will be forthcoming.

IMPORTANCE OF KNOWING COST OF JOBS

A cost system as it is imperative to the large concerns is just as much a necessity to the smallest master in our business if it is his wish to become successful. The master in our trade who employs from two to twelve men with a relative amount of capital invested as compared with the larger concerns having a half dozen subdivisions is even in a far more precarious position by not knowing his ''cost'' than one of the smallest subdivisions.

SPECIAL COST SYSTEM NECESSARY FOR SHEET METAL TRADE

Recently we had presented through the columns of the trade journals an outline of the cost system as it applied and appears to the master plumber and his business. It is not my intention to criticize this method except to say that it would not do for the master sheet metal contractor, but there is just one part of this article I would like to quote. In speaking before the annual convention of the master plumbers' organization S. H. Morgan says, ''The greater number of the men here today came into the plumbing business originally as apprentices at the ages from 13 to 18 years with practically no education and became journeymen; they became artisans; they understood the installation of plumbing material; in course of time they became dissatisfied, were not securing a sufficient income to satisfy them, and they became employers. They have, as a rule, and all rules have exceptions but little or no business training and are not equipped for the conduct of a plumbing or any other business.''

Let me add a little to this—just such men, men who have entered business under such a handicap and without destructive vices are the men who can, if they will, apply the brain that taught them mechanical skill to the other and more important part of the business, the technical office half, and master it. In the progressive times of the present there is no excuse for any merchant not knowing the fundamental principles of bookkeeping.

PAYING CUSTOMERS FOR PRIVILEGE OF DOING WORK

We are all aware that when you touch a man's pocketbook you have his notice, and we all know of men who unknowingly touch their own pocketbooks, either because they do not stop to think or because of their lack of knowledge of the clerical side of their business, for it is hard to believe that a master, if he knew, would present his customers with his hard-earned cash, yet that is just what is happening each day in our trade and by a majority.

HOW THE ASSOCIATIONS HELP

We seek through our local organization in the main to interest our fellow members and tradesmen by various commonplace methods. The daring ones among us, so it looks to the balance, and who are generally the successful men, give definite information, facts and figures at our meetings of their methods; they tell us of systems they use, believing that in so doing others will follow the example and fairer competition will result. These are the men who have the moral courage to refuse to bid, when the profit is overlooked.

LEAVING UNPROFITABLE CONTRACTS ALONE

These are the men who cannot be cajoled or bullied by the contractor, whose first estimate is the last and are free from entangling alliances. These are the men when they find that an architect and builder uses coercion and intrigue to obtain estimates, using you and me against each other, that leave them absolutely alone, and we should follow their example and see to it that such persons do not bid with our help. I cannot help but repeat this fact to you as well as you know it. It is a deplorable state of affairs that the builder and architect and owners can present a building completed with the invested capital of the subcontractor less the profit. I know of many such instances and these buildings stand as a loving remembrance to the ruined subcontractor of his philanthropy.

CONTRACTORS CAN REMEDY PRESENT CONDITION

The local association have a work to better this condition and repay its members in dollars and cents. Some will tell you it is a custom and hard to reach. I don't believe it. Custom or no custom, if it is wrong, right it, and you know it is in our power together with the other trades to do it and to lay the foundation we have a work in perfecting ourselves on the cost of carrying on our business.

THE COST FACTOR ITSELF

The cost factor, overhead charge, loading charge, or cost of doing business, whichever term you may choose to use, is the amount of money spent in bidding for business, together with that spent in supporting an establishment and an organization with which to care for its performance after it is obtained. It is the most important, single item of the make-up sheet, and when known, no matter how ugly it may seem, places you on a solid foundation, other things being equal. It tells the truth of your position in the business world.

Each individual dollar that is a part of your investment shrinks by its use and either loses itself in whole or part or returns with a companion smaller or as large, depending entirely upon the amount of work you give it to do.

This dollar when given too hard a task is in precisely the same position a mechanic would be placed by attempting to do in one day that which it will require two men to perform in the same period.

The intricacies of business, however, prevent us from following each dollar as it plays its individual part and, therefore, we seek combinations of facts, comparing one with the other to obtain a percentage basis of which we make use in reckoning the net cost on the make-up sheet.

PROFITS FALL BELOW ESTIMATE IN MAJORITY OF CASES

You may doubt the fact that from 65 to 75 per cent. of the master sheet metal contractors who figure to make a given profit on contract work in reality make one-third to one-half of it or lose money, and are still doing so, but it is so if as a basis the selling price of the large majority of jobs during the past three years be taken. To illustrate this I am going to place before you the contract price and the make-up sheet of one particular small job.

ESTIMATE SHOWING HOW SUPPOSED PROFIT DISAPPEARS

Contract price for 10 sq. ft. tin roofing at $8.00			$80.00
Make up sheet shows:		Cost:	
Material	$51.00		
Incidentals	5.50	Material	$46.25
Labor	24.00	Labor	20.00
	$80.50		$66.25
Selling price			$80.00
Cost			66.25
Supposed profit (20 per cent.)			$13.75
Overhead charges (60 per cent. on labor)			10.00
Net profit (less than 6 per cent.)			$3.75

In reality his overhead charges on his cost of $66.25 = $10, making the profit $3.75 or less than six per cent.

I will ask you to take my word for the present that the overhead charge on this contract was $10. Had the owner of this particular property asked for competitive bids and huckstered them our friend may have accepted the job at 15 per cent. profit and lost money, a common case, believing he would make money, not knowing his ‘‘cost factor’’ and believing his actual net cost was $66.25. You may ask how, then, do a great many stay in business? The majority merely eke an existence, obtaining from the men who trust them sufficient to keep themselves and a balance to give the contractor and builder for the privilege of knowing him.

HOW JOBBING BUSINESS SAVES CONTRACTOR

If it were not for the jobbing end of our business three times as many would fail sooner than they do. A few days ago in talking with a master sheet metal man about his association dues, he told me he was too poor to remain a member of the association. I asked him: ‘‘I thought you said you never had any trouble with operation work?’’ ‘‘Well,’’ he said, ‘‘I imagined I knew what I was doing and all the time the builder was taking me for a sucker. I imagined he was my friend.’’ This man had a good jobbing business and made money and sunk it all because he did not know how to figure on many jobs. He claims he figured them at actual cost and added 10 per cent. for profit, an absolute loss on each.

PRINCIPLES OF MAKING UP ESTIMATES

We are told under one method of computing costs that it is necessary to keep a strict account of your expense, item by item, for a full year. Compare this total with the gross amount of business during that year and obtain the per cent. ratio as expense is compared to the gross business. This percentage is the cost factor.

When estimating we first obtain the actual cost of material and labor and then by comparing the cost factor to a given table we are told to add a higher percentage in order to obtain a certain profit, viz.: The gross business amounts to $10,000, expense, $2000—a cost factor of 20 per cent. By referring to the table we find that to obtain a profit of five per cent. where the cost factor is 20 per cent. we must add to the actual cost of material and labor, 33⅓ per cent. If a profit of 13½ per cent. is desired we must add 50 per cent.

Let us assume that we have a contract, viz.:

ESTIMATE FOR GALVANIZED IRON CONTRACT

Galvanized Iron Cost	
1500 lb. at 4 cents	$60.00
Incidentals	15.00
Labor	25.00
	$100.00
20 per cent. ''factor''; profit 13½ per cent.; add 50 per cent	50.00
Selling price	$150.00
Cost	
	$100.00
13½ per cent. of profit (on selling price)	20.25
Overhead charges	29.75
	$150.00
	$100.00
13½ per cent. profit (or cost)	13.50
Overhead charges	36.50
	$150.00

Suppose, however, that the owner concludes for certain reasons to use copper instead of galvanized iron.

ESTIMATE FOR COPPER CONTRACT

Copper Cost	
1500 lb. at 20 cents	$300.00
Incidentals	15.00
Labor	25.00
	$340.00
20 per cent. ''factor''; profit 13½ per cent.; add 50 per cent.	170.00
	$510.00

Cost

	$340.00
13½ per cent. profit (on selling price)	68.85
Overhead charges	101.15
	$510.00
	$340.00
13½ per cent. profit (on cost)	45.90
Overhead charges	124.10
	$510.00

By comparing the "cost factor" of the two jobs you will at once note the decided difference on practically the same amount of work and a profit obtained as asked for, namely, 13½ per cent. on the cost and overhead charge. Let us assume under this rule that 75 per cent. of A's business during the year is galvanized iron contracts and B's copper. A would undoubtedly make a profit, but B's profit would amount to three times in excess of that which he asked.

The large organizations by sheer necessity were obliged to adopt some sort of cost factor and it has proven to them the most profitable adjunct to their business. It is not a new thing for it has been in existence since the first days of manufacturing in many varied forms, and if this factor is so important to an organization that can permit a large loss without noticeable inconvenience how much more important should it be to the man who cannot afford a few hundred dollars loss and by so doing suffers the loss of credit?

The large organizations have a department and bookkeepers whose work it is to guard closely the cost factor. This would be impossible for the average sheet metal contractor. Therefore, it is necessary for him to have a simple, yet accurate method, which one person can handle and he himself understand.

FOUNDATION FOR A COST SYSTEM

No matter what may be the line of business, by a simple subtraction example any man can tell what he spends for all purposes in one year. This is the foundation.

Divide the money spent into three items, viz.: 1. Merchandise. 2. Productive labor. 3. Balance.

No. 1. Merchandise—your invoice book or bills will give you the sum total of material bought during one year.

No. 2. Productive labor—your time sheets or time book will give you the amount paid your men during the same period. By productive labor is not meant the salary of your clerks, bookkeeper, stenographer, porters, or drivers, nor that which yourself and foreman draw for supervision of the work. It means only that amount of money paid your men, for whose time you charge on your work.

A spends during the year:

Amount of business done		$10,500
For merchandise	$3000	
For productive labor	5000	
		8,000
Balance, which we now term expense		$2,500

The trend of business, the gross amount of business and the gross expense have always been considered by the number of men employed. The amount of merchandise bought for immediate use, the amount of expense incurred fluctuates in comparison with the amount spent for productive labor, or, in other words, the number of men employed. We have, therefore, a medium which fluctuates only with the items of business, singly and collectively.

The cost factor, meaning expense of doing business, therefore reckons with only two essentials—productive labor and expense or the balance. The relationship between these two items in any business is close, in that either one is dependent upon the other. Let us, therefore, compare these two, taking the steadiest item in our business as the case, and we find that our expense is 50 per cent. of our productive labor.

Expense at $2500 means 50 per cent. of productive labor at $5000. A's cost factor, therefore, is 50 per cent.

It, therefore, follows that inasmuch as we arrived at our cost factor by comparison of expense to productive labor, we must still continue the comparison. Take, for instance, the contract on 10 squares of roofing referred to in the foregoing.

The cost of material	$46.25
The cost of labor	20.00
	$66.25
50 per cent. cost factor on labor	10.00
Cost	$76.25

You can readily see that had this man known his cost factor at the time he would not have thought of doing the job for $80.

Let us again consider the galvanized iron and copper jobs under this factor, assuming that the cost factor is 50 per cent.

Cost of galvanizd iron	$60.00	Cost of copper	$300.00
Incidentals	15.00	Incidentals	15.00
Labor	25.00	Labor	25.00
	$100.00		$340.00
Cost factor 50 per cent. on labor	12.50	Cost factor 50 per cent. on labor	12.50
	$112.50		$352.50
13½ per cent. profit	15.19	13½ per cent. profit	47.59
	$127.69		$400.11

These two figures are supposed contracts and ones that anyone of you may be called to estimate upon, possibly not in this proposition, but you have only to figure by your own method the copper job according to the first rule, and you knowing your capacity will at once see the uselessness of sending in your bid.

Let us, however, take an actual job, using the factor gained by the experience of a master in Philadelphia and present in the room, who will tell you it is the safest method he knows of; his cost factor is 55 per cent.

ACTUAL ESTIMATE ON JOB AT HOLMESBURG

The county prison at Holmesburg, Pa. By careful computation the result was as shown in the accompanying table (see page ——).

My friend was one of five bidders and his advantage on this job largely consisted of putting his own tin together and his close proximity to the job. The $183.15 for overhead charges he has proven by his previous years' experience has returned to him his cost of doing business on the amount invested with a ratio of profit on the same.

	Estimate		Cost
Material	$1119.00		$1094.24
Labor	380.00		333.00
	$1499.00		$1427.24
55 per cent. overhead charge	209.00	55 per cent.	183.15
	$1708.00		$1610.39
Profit 30 per cent.	512.40		
	$2220.40		
Bid			$2220.00
Cost			1610.39
Net profit (38 per cent.)			$609.61

Another job. This was a new building and competitive bids were asked on a warm-air furnace job. The figures on this job are true, with a possible exception of the pipes and fittings, etc., item, which my friend was ashamed to give me, but knowing the balance, I could find this item. I believe, however, this item cost more than shown.

ESTIMATE ON WARM-AIR FURNACE JOB

Warm-air furnace job complete, $160.

	Cost	Selling Price
Furnace	$58.10	$70.00
Pipe, fittings, etc.	41.76	60.00
4½ days, man and helper	22.50	28.80
	$122.36	$158.80

Selling price	$160.00
Cost	122.36
Supposed profit (30 per cent.)	$37.64

The builder, however, juggled the contract and awarded it as a personal favor at $142. This would give a profit of 16½ per cent.

Selling price	$142.00
Cost	122.36
Profit (16½ per cent.)	$19.64

About that time we were figuring costs, and with the previous year as a guide this contractor afterward found his factor to be 52 per cent. We, therefore, figured the job together as follows:

Material	$99.86
Labor	22.50
Net cost	$122.36
52 per cent.	11.70
	$134.06

Bid	$142.00
Cost	134.06
	$7.94
There was an additional day spent on something, not his fault.	3.00
	$4.94
He waited 9 months for his payment, at ½ per cent. per month.	6.39
Loss	$1.45

Now I believe you catch the method, and you must admit it is safe. Every example has its proof, and it is not hard for you to prove this method, for by keeping an account of the cost of material on each contract job, the expense, the percentage of your cost factor and the profit made on each for a certain period after you have established your cost factor from the past year or year's business, you can readily figure if you made the profits you figured to make and repaid the overhead charges with its proportionate profit.

The computing of material and labor on any contract is part of your mechanical experience. The cost factor is office experience; sprinkle these two with a grain of common sense and a little study and I believe you will have a cost computing method hard to beat and that will mean many dollars and cents saved you. The master who seeks to perform his work at less than cost, not knowing his cost factor, will one day find his mistake with regrets, but you are in a position to know your cost absolutely.

It is easy for anyone to bid an excess profit to cover everything, but this does not win competitive jobs and when close competition is necessary by not using a cost factor you are never sure of your ground.

MINIMUM COST FACTOR

The cost factor under this system is rarely less than 45 per cent. in the business of the sheet metal contractor. Some have a factor of 85 per cent., and even higher, and one department of a manufacturing concern where machinery is almost automatic has a factor of over 300 per cent. You must remember, however, that this factor is not of the material or total, but of the labor that enters into a contract, and after all the ratio of expense, as compared with a solid base to which it relates, is the nearest approach to a division of your expense or cost of doing business that is possible.

TAKING CARE OF LOSSES ON SOLDER AND THE LIKE

One more matter and I am done. Those who have adopted this method have considered the many small leaks incident to our business. Let us take, for instance, solder, coal, rosin, sheathing paper, etc. These items represent a certain proportion of your merchandise account and a proportion of this merchandise account is never accounted for; it is lost somehow. It is practical to charge such items where loss is sustained to expense and reduce your merchandise account. It would naturally raise the cost factor, but it would reduce the merchandise on each contract, known possibly as illustrated as portion of incidentals, and prevent leaks.

Many of you can also recall being obliged to send your men back to a job after being completed to perform a work, a small amount probably, yet a number of such cases means considerable in a year, claimed to be due to your carelessness and you finish it rather than have a dissatisfied customer. This item should be accounted for in an individual account; contingencies, for want of a better word, should be charged to expense.

However, if you have the outline of the method, and if you give it a trial, taking the year previous as your basis, you will find the study so interesting that you can originate many changes in it as it applies to your business, and yet not alter the original plan.

It is also well to remember that you can reckon this factor half-yearly, quarterly or monthly, after you have first arrived at a base from one or five years previous, as you please, depending entirely upon the fluctuation of your gross business during that period.

In presenting this method it is not the purpose to say that this is the only correct method, but is used by the largest and smallest concerns in our business and has proved its worth for correctness and simplicity.

COMMENT ON ESTIMATING ON SHEET METAL CONTRACTS

From B. F. John, Philadelphia, Pa.—I strongly advocate using the cost factor percentage of productive labor in estimating on every contract. In reply to the question as to why I would base this cost factor on labor only, I will say that the division of expense must be in proportion, and must naturally be based on an element in business which rises and falls with the trend of it. Productive labor fluctuates in the contracting business only in proportion to the amount of business done, and, therefore, it proves a safe base. There is no other item in the sheet metal business of which I know that would answer the same purpose.

From the second question, I am under the impression that this correspondent has not fully understood the tenor of my paper as read at the recent annual meeting of the National Association of Sheet Metal Contractors. In that paper I aimed to give to sheet metal contractors a method of estimating so that they might include in their estimate a sufficient percentage to cover their cost of doing business. It was not my object to show them a method of fixing the profit, that is optional. I aimed to take care of the overhead expense only.

If the overhead charges were based on the money invested, by a comparison of the copper and galvanized job, would it not be fair to charge five times more overhead expense on the copper job than the other? I believe everyone will agree with me that this would be rather ridiculous. We receive full value for the copper when the profit is added—why burden your expense with something that is not true?

Your expenses for one year can be easily ascertained from your records. Divide this expense into four parts and keep account of a series of contracts for three months —namely, profit, overhead charges, expense, and the cost percentage factor—and it will surprise you the nearness of the proof.

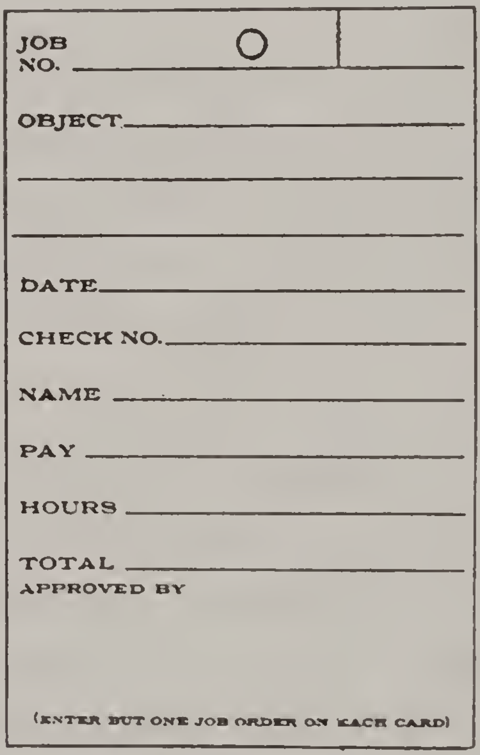
I agree that some other methods which show a combination of profit and overhead charges considered on the gross amount of business would show a different price, but I am unable to find where it is possible to determine accurately just what is the "cost" on each individual contract and after all to know accurately your "cost." The amount included for overhead charges is the one item mostly desired by a good estimator.

SHEET METAL SHOP COST KEEPING

Valuable Suggestions Offered by a Working System for Application to Shops in General

By Frederic G. Coburn

A prime requisite to the efficient organization and operation of a shop is a good cost-keeping system. The shop's organization may be ever so bad, its efficiency ever so low —this may even be suspected—but without an efficient cost system conditions cannot actually be known. Moreover, exact costs must be known in order to get business at paying figures, just as well in the small jobbing shop as in the large manufacturing shop putting out several different lines.



JOB NO. ○

OBJECT

DATE

CHECK NO.

NAME

PAY

HOURS

TOTAL

APPROVED BY

(ENTER BUT ONE JOB ORDER ON EACH CARD)

Fig. 1—Time Card

In the navy yards, for many years, much attention has been paid to getting exact direct labor and material costs; and in the last year the skeleton of a system for getting total costs has been instituted, although the laws are still such that they cannot as yet be obtained. The workings of this system as applied to the sheet metal shop in one of our navy yards, modified to suit more nearly the average commercial requirements, may be of interest.

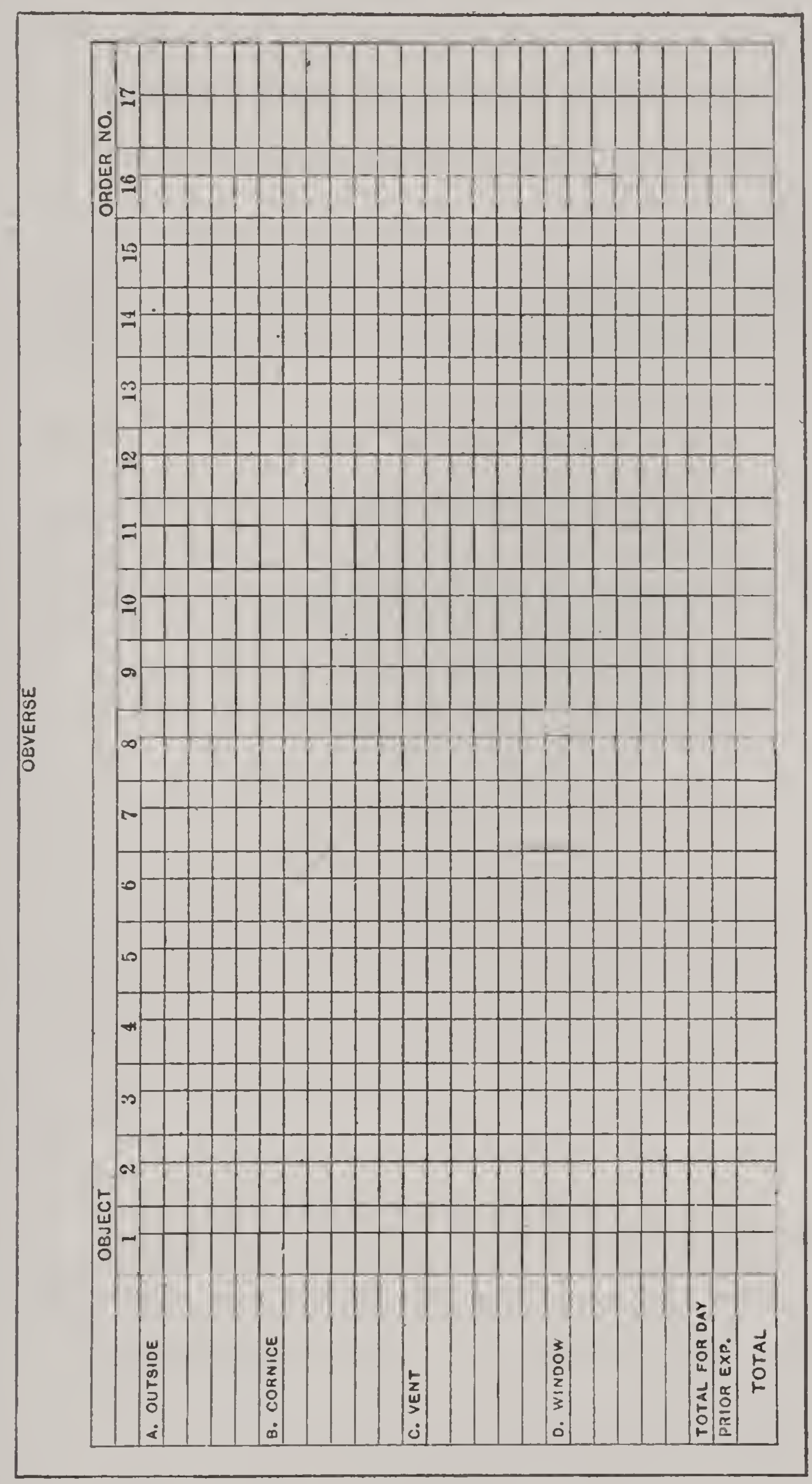


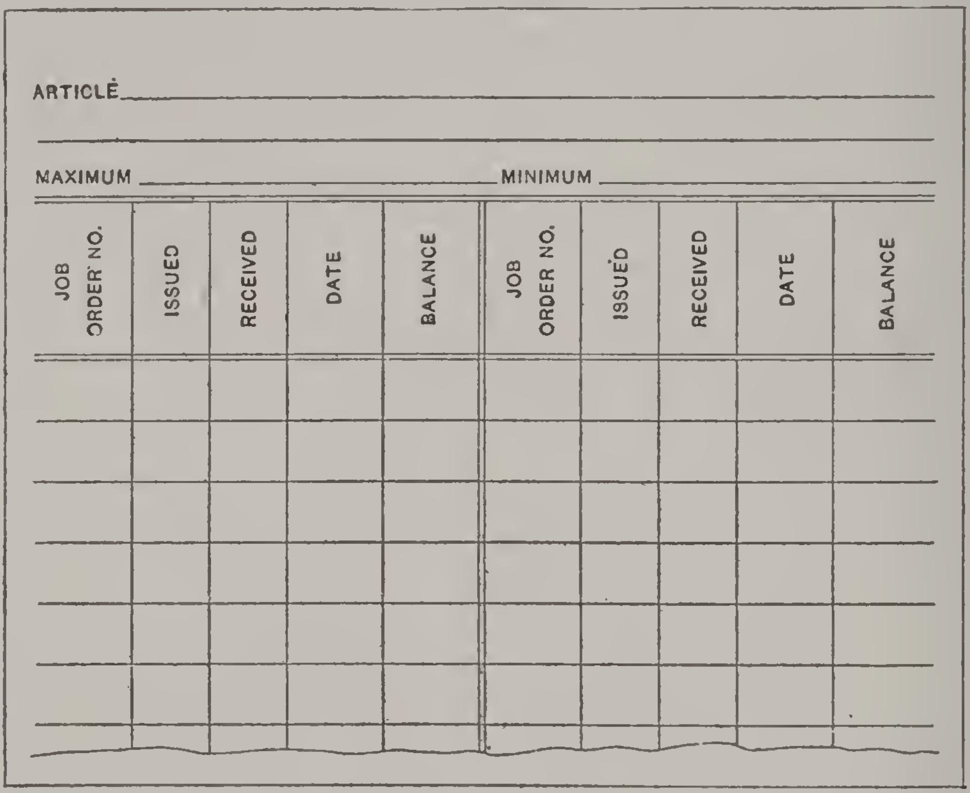
Fig. 2—Order Card; Reverse Side Completes the Month

TREATMENT OF COSTS BY DEPARTMENTS

Practically every sheet metal shop has two departments, the shop itself and the outside force. And the larger shops, particularly those in a manufacturing business, have divided the shop into departments, handling different classes of work, such as cornices, heating and ventilation work, etc. It is obvious that the costs of operating these departments are widely different, and for this reason it is misleading to spread the burden equally over all the work of the establishment. By making the work of each department pay its own costs, we can get an unequal but equitable burden of distribution.

DIVISIONS OF COSTS

Costs naturally divide themselves into two grand divisions—labor or services, and material. Labor is again to be divided into that directly applied to the product, and that indirectly applied, such as superintendence, advertising, insurance and other accessory expenses. Material costs are divided into three kinds, those of materials actually entering into the product, of materials used and consumed in making the product, and of materials accessory to the production but not consumed. Steel, fuel and rolls illustrate these three kinds.



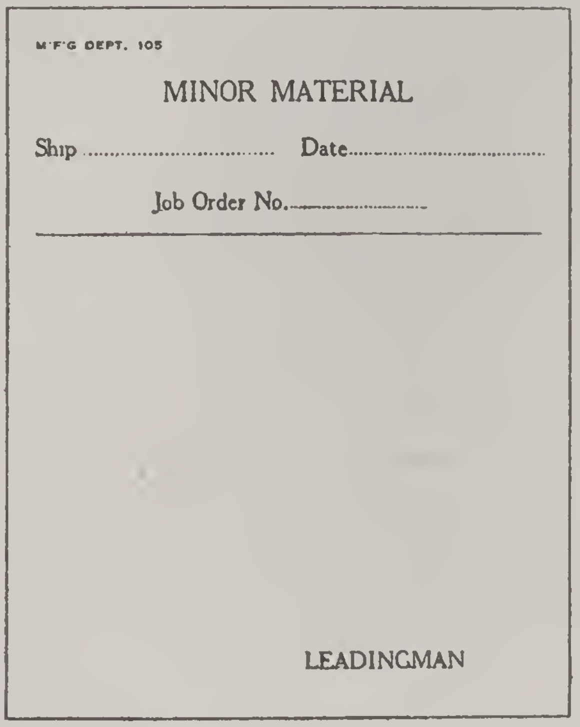
ARTICLE

MAXIMUM MINIMUM

JOB ORDER NO.	ISSUED	RECEIVED	DATE	BALANCE	JOB ORDER NO.	ISSUED	RECEIVED	DATE	BALANCE

Fig. 3—Stock Card

Only the labor directly applied to, and the material actually entering into the product, can be charged direct to the order. All the other expenses are indirect and must be applied to the order in an indirect way. There are several of these ways, such as a percentage of direct labor, a flat hourly rate for the time the job is worked on, the machine rate plan, etc. Space does not permit of a discussion of the relative merits of these three methods; I am describing a method involving proration by a percentage on direct labor and will make no further comment than this, that it is easy to institute and is so widely used that costs and prices are comparable. It is an excellent "first aid" and offers no obstruction to the introduction of a better method later if such action is found justifiable.



M'F'G DEPT. 105

MINOR MATERIAL

Ship .... Date ....

Job Order No. ....

LEADINGMAN

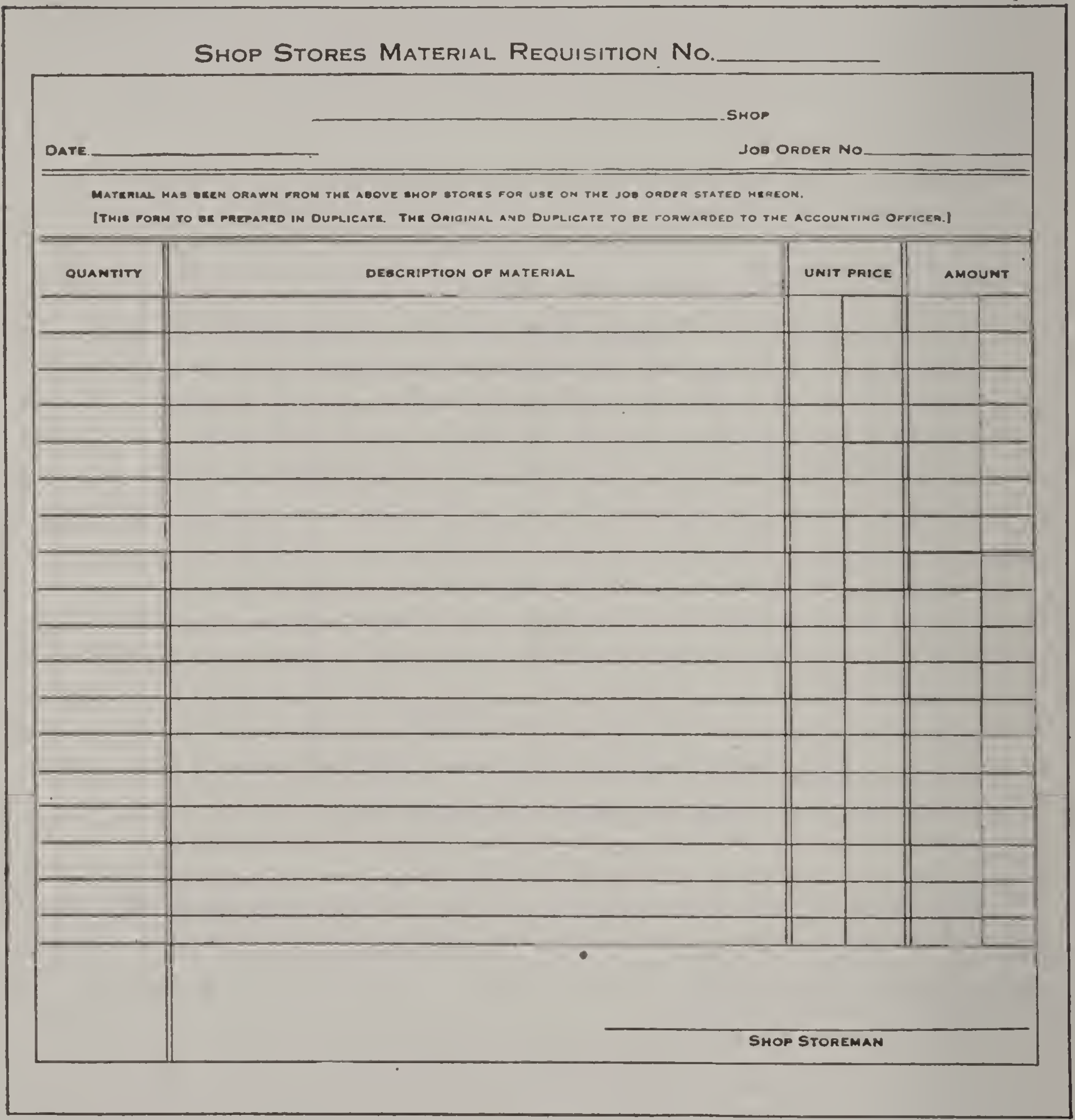
Fig. 4—Minor Material Slip

With this brief discussion of the divisions and kinds of costs, we can proceed to the consideration of the major details of the system.

DIRECT LABOR CHARGES

Each employee turns in his time on a time card, Fig. 1. The letter in the upper right-hand corner designates the department whence the charge comes, and the only color variation is made in the case of overtime, time cards for which are pink. The employee sets down the order number, operation, his name, rate of pay, and the hours on the operation. A separate card is required for each order, and may be required for each operation of each order, when it is not desired to assign separate order numbers for the various operations. The card is O. K.'d by the foreman in immediate charge of the work, and then goes to the accounting office.

Here the cards are first thrown together by departments and checked against the time clerk's figures obtained from the muster, and differences reconciled, thus *tying* the *cost of work* to the *payroll*. The cards are then thrown together by order numbers and posted to the order card. Fig. 2 shows the obverse and reverse sides of this card, modified to suit the conditions of this article.



SHOP STORES MATERIAL REQUISITION NO.__________

____________________ SHOP

DATE __________ JOB ORDER NO. __________

MATERIAL HAS BEEN DRAWN FROM THE ABOVE SHOP STORES FOR USE ON THE JOB ORDER STATED HEREON.

[THIS FORM TO BE PREPARED IN DUPLICATE. THE ORIGINAL AND DUPLICATE TO BE FORWARDED TO THE ACCOUNTING OFFICER.]

QUANTITY	DESCRIPTION OF MATERIAL	UNIT PRICE	AMOUNT

SHOP STOREMAN

Fig. 5—Shop Store Material Requisition

One card is provided for each order number, and its function is to gather together the daily labor costs on each number, and to record them in sufficient detail to permit subsequent analysis. The total charge for the day from the heating and ventilation department, for example, is entered under the date abreast "C Ven"; or if it be a job for which it is desirable to know the costs of the operations, these may be set down in the blank spaces provided, "laying out," "cutting," "punching," etc., and the totals for these operations set abreast them, in-

ACCOUNT	SYMBOL	July		August		TOTAL THIS YEAR		AVERAGE THIS YEAR		AVERAGE LAST YEAR		SYMBOL
		LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	
Salaries Civ. Ass'ts	A A											A A
Yard Maintenance	A B											A B
Clerical Force	A C											A C
Drawing Office Total	A D											A D
Miscel. Wages	A D A											A D A
Stores & Supplies	A D S											A D S
Tests & Inspections	A E											A E
Industrial Yard Craft	A F											A F
Heat, Light & Power Total	A H											A H
Labor	A H A											A H A
Fixtures & Furniture	A H C											A H C
Plant Repairs	A H E											A H E
Fuel	A H F											A H F
Lighting Ships	A H K											A H K
Current, Mfg. Dept.	A H L											A H L
Stores & Supplies	A H S											A H S
Outside Piping & Wiring	A H W											A H W
Water, Gen'l Purposes	A H Z											A H Z
Care of Dry Docks	A J											A J
Holiday	A K											A K
Leave	A L											A L
Disability	A M											A M
Office Maint. & Rep's	A N											A N
Office Stores & Supplies	A O											A O
Yard Machinery	A P											A P
Storehouse Expense, Part												
Inspection & Tests	A Q											A Q
Minor Repairs	A T											A T
Handling Stores Miscel.	A U											A U
Handling Stores Rwy.	A V											A V
Handling Stores Genl.	A W											A W
Fire Protection	A X											A X
Telephone & Telegraph	A Y											A Y
Buildings	A Z											A Z

Fig. 6—Analysis of General Expense

stead of entering the total charges from that department as a lump sum. These costs are then always available for analysis, or for use in estimating.

DIRECT MATERIAL CHARGES

Material charges are handled in a more simple manner, as their frequency is less. The shop storeroom is maintained by the tool-room keeper, who carries a stock card (Fig. 3) for each kind of goods. Material is issued in the shop on presentation by the workman of a Minor Material Slip (Fig. 4), which must be O. K.'d by the outside boss in the case of outside work. The storekeeper retains this slip, as he must be able to account for his stock and turns into the office a Shop Store Material Requisition (Fig. 5), priced, which goes to the folder in the file where the copy of the order is filed.

THE EXPENSE ACCOUNT

Each department has its individual costs of superintendence, sweeping, care of tools, maintenance of machinery, etc. The most convenient way to handle these is to classify them, and treat each class as if it were a standing order. These orders may then be symbolized, at once distinguishing them from production orders and making them easy of reference and use. The department expense account is known as the "B" Account; and the outside department expense is known as "BA," the cornice department as "BB," etc. Each class has its letter, and the double prefix absolutely locates it; thus "BBM" is the maintenance of cornice department machinery, and "BAA" is outside supervision. In an accompanying table is reproduced the classification used in this shop, the lettering indicating the sheet metal window and door department.

However carefully the shop may be divided into departments, there remain charges which cannot be assigned to any particular departments, such as office and draughting room expense, light, general supervision, rent, etc., and these must be treated as a general expense. This account, the "A" Account, is classified and symbolized in the same way as is the "B" Account, but as there is little similarity between navy yard conditions and those of commercial business, it is not worth while to dwell on the details of the sub-division. Fig. 7, however, indicates the principles. Order cards (Fig. 2) are kept for these standing orders as well as for those of the "B" Account, and the material requisitions, bills, memoranda, etc., are filed by months in folders so as to be convenient of access.

ACCOUNT	SYMBOL	July		August		TOTAL THIS YEAR		AVERAGE THIS YEAR		AVERAGE LAST YEAR		SYMBOL
		LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	LABOR	MATERIAL	
Superv'y & Office Force	B A											B A
	B B											B B
Fixtures & Furniture	B C											B C
	B D											B D
	B E											B E
Tools	B F											B F
Tools Special	B G											B G
Tool Room Labor	B H											B H
	B J											B J
	B K											B K
	B L											B L
R. & M. of Machinery	B M											B M
	B N											B N
	B O											B O
Prop. Power Charge	B P											B P
Miscels. Labor	B Q											B Q
Correction of Errors	B R											B R
Genl. Stores & Supplies	B S											B S
	B T											B T
	B U											B U
	B V											B V
	B W											B W
	B X											B X
	B Y											B Y
R. & M. of Buildings	B Z											B Z

Fig. 7—Analysis of Departmental Expense

PRORATION OF EXPENSE

To make each order carry its share of the expense accounts, it is necessary to wait until the end of each month to make the proration. The "A" Account labor charges may then be totaled and divided among the departments in the ratios of their totals of *productive* labor. The "B" Account labor charges are then totaled for each department, and each such total, plus such department's share of the "A" Account, is prorated to the work of such department, the percentage being obtained by dividing this sum by the total of productive labor in such department. It is a simple matter to make this proration, running through the order cards one department at a time, with the slide rule, entering the amount abreast the department and operation, in the column headed ''Indirect Labor.'' The material is prorated in exactly the same way, on the basis of productive labor, the charge being entered in the column headed ''Indirect Material.''

It is not convenient, however, to wait until the end of the month, as this would delay invoices, bills, etc., as well as the analysis of costs. Arbitrary percentages based on experience are therefore used, a profit and loss account being opened against each department to take care of the difference between actual expense and amounts prorated. By judicious choosing of percentages and close watching the proration may be made very close, providing the volume of work is fairly constant.

FINAL ENTRY

It is a real necessity to have complete costs available for analysis, use in estimating, etc., and a card file is the most elastic and satisfactory. Conditions vary so widely that it is scarcely worth while to show a sample form, but it is well to caution against the use of cards too small.

A 5 x 8-inch card costs but an inappreciable trifle more than a 3 x 5-inch card, and it can be made to tell a whole story, presenting order number, customer, brief of order, cost analysis, and reference to plans, correspondence, and detailed costs.

For the expense accounts analysis sheets are required. Fig. 6 table exhibits the analysis of the ''A'' Account, and Fig. 7 that of the ''B'' Account. Fig. 7 is headed ''Analysis of *Shop* Expense,'' but for this article the substitution of ''department'' for ''shop'' must be understood. One of these sheets is maintained for each department, and is a continuous annual record, of the greatest assistance in operating the departments. The classification of Fig. 7 is, of course, only illustrative; it is not applicable to commercial shops. It indicates the method of classification, however, and its great value to the manager is obvious.

FLEXIBILITY OF THE SYSTEM

There is nothing in this system to hamper or obstruct the introduction of modern scientific management; indeed, it is being used in this navy yard in connection with a skeleton of a scientific organization in the sheet metal shop, which will be developed when the volume of work warrants it. It is adaptable to the use of time clocks, and can be modified to suit the conditions of piece rate or premium payment systems. The use of cards instead of books makes the system very flexible.

One of the important features to be emphasized is the method of handling material charges. In many shops the use of scrap is considered clear gain, and not chargeable to the job; but the fault with this lies in the fact that some other job carries the cost that the scrap material job should carry, and there lurks in this practice the danger of not getting a new dollar for an old one. By using the minor material slips as memoranda for the stock man, scrap material can be returned to stock and taken up on the cards, being credited to the job originally charged with it by forwarding to the office a material requisition (Fig. 5) plainly stamped ''Returned Material,'' and then when the scrap is drawn for a job, this latter bears the cost of it. The same procedure may be followed when an excess of material has been drawn for a job; and it can readily be seen that this can be extended to include cornice parts, clips, etc., manufactured in quantity for use in small numbers.

This is a large subject, which the writer has had to treat in a comparatively small space, so that the object has been rather to present the principles and major details than a minute description of its workings. It has been impossible to treat of the uses to which the order cards can be put in cost reduction, or the value of the expense analyses to the manager, either of which would require considerable space; but it is probable that these features will be apparent to those readers interested in them.

"BD"—WINDOW AND DOOR DEPARTMENT

BDA—Supervisory and Office Force:

Includes all wages paid to foremen, quarter men and leading men and others acting in a supervisory capacity; also the pay of clerks, messengers, planners and others employed in the foreman's office or in making up time or costs. Does not include their time when on holidays or leave with pay.

BDB.—

BDC.—Fixtures and Furniture:

Includes all costs, both labor and material, for fixtures and furniture, both fixed and movable, such as benches, shelving, partitions, desks, stools, clocks, speaking tubes, bells, trays, tote boxes for tools, etc. This covers repairs and maintenance, but not new work. Charges for new work and improvements to be made to specific orders.

BDD.—

BDE.—

BDF.—Tools.

Includes labor and material expended for the repair and maintenance of tools and all tools purchased when such tools merely maintain, but do not increase, the tool-room stock. Charges for dressing and grinding tools to be made to this order.

BDG.—Tools, Special:

Includes all such tools as jigs, gauges, templates, etc., for manufacturing. Covers repairs and maintenance, but not new work.

BDH.—Tools, Operation of Tool Room not Specifically Covered:

Includes all wages for men working in tool room and not otherwise specifically covered. Includes men serving out tools in issue room and tool boys.

BDJ.—

BDK.—

BDL.—

BDM.—Machinery, Machines Operated by Hand or Power:

Includes all labor and material required for the repair and maintenance of machines, including cranes and hoists, motors, belting, line shafting, and covers such material as belt lacing, glue, oil for lubrication (not oil or compounds for cutting tools), etc. Charges for new work and improvements will not be made to this order.

BDN.—

BDO.—

BDP.—Power: Proportionate share of power charges.

BDQ.—Miscellaneous Labor:

Includes all wages paid for work that cannot be charged to a particular order, such as cleaners, crane operators, etc., but does not include any labor that can be charged to other "BD" orders.

BDR.—Miscellaneous—Correction of Errors:

All labor and material required to correct errors made by this department.

BDS.—Miscellaneous—General Stores and Supplies:

Includes all material which cannot be charged against "output," which, while being used in the production of output, cannot, on account of the small quantities required for individual jobs, be properly divided.

BDT.—

BDU.—

BDV.—

BDW.—

BDX.—

BDY.—

BDZ.—Buildings, Repairs and Maintenance:

Includes all labor and material expended in the repair and maintenance of department buildings. No new work or large repairs in the nature of renewals to be charged to this order. This will be covered by specific orders.

COST-KEEPING SYSTEM FOR SHEET METAL WORK

Explanation of a Simplified Method of Keeping Account of Materials and Time and Computing Cost on Sheet Metal Contracts—Determining Percentage to Be Added for Overhead Expense

By Roy F. Danzer*

Possibly no member of the manufacturing world today pays so little attention to details of cost keeping as the sheet metal contractor. Neither is this negligence confined to small shops only, but is to be found with equal frequency in the larger shops throughout the country.

REQUISITES OF ANY COST SYSTEM

The main requisite of a cost keeping system is absolute certainty and effectiveness. But a serious consideration to be dealt with is the vital fact that it must be SIMPLE. I wish I might write that word *simple* in large red capitals to impress it upon every reader.

ELEMENTS ENTERING INTO COST

Now then, having ventured a definition as to what such a system should be and what it should accomplish, let us take into consideration the elements that make up a Cost in a sheet metal shop. First, there is Labor, but allow me in passing to remark that where any great amount of labor is involved any cost keeping system devised will utterly fail as an aid to future quotations on similar construction. However, since labor is an element that enters into this matter so weightily, although so variably, it must be carefully taken care of.

Permit me to digress long enough to remark that in our shop we had an important demonstration of this fact, since we built several months ago a large tank from 16-

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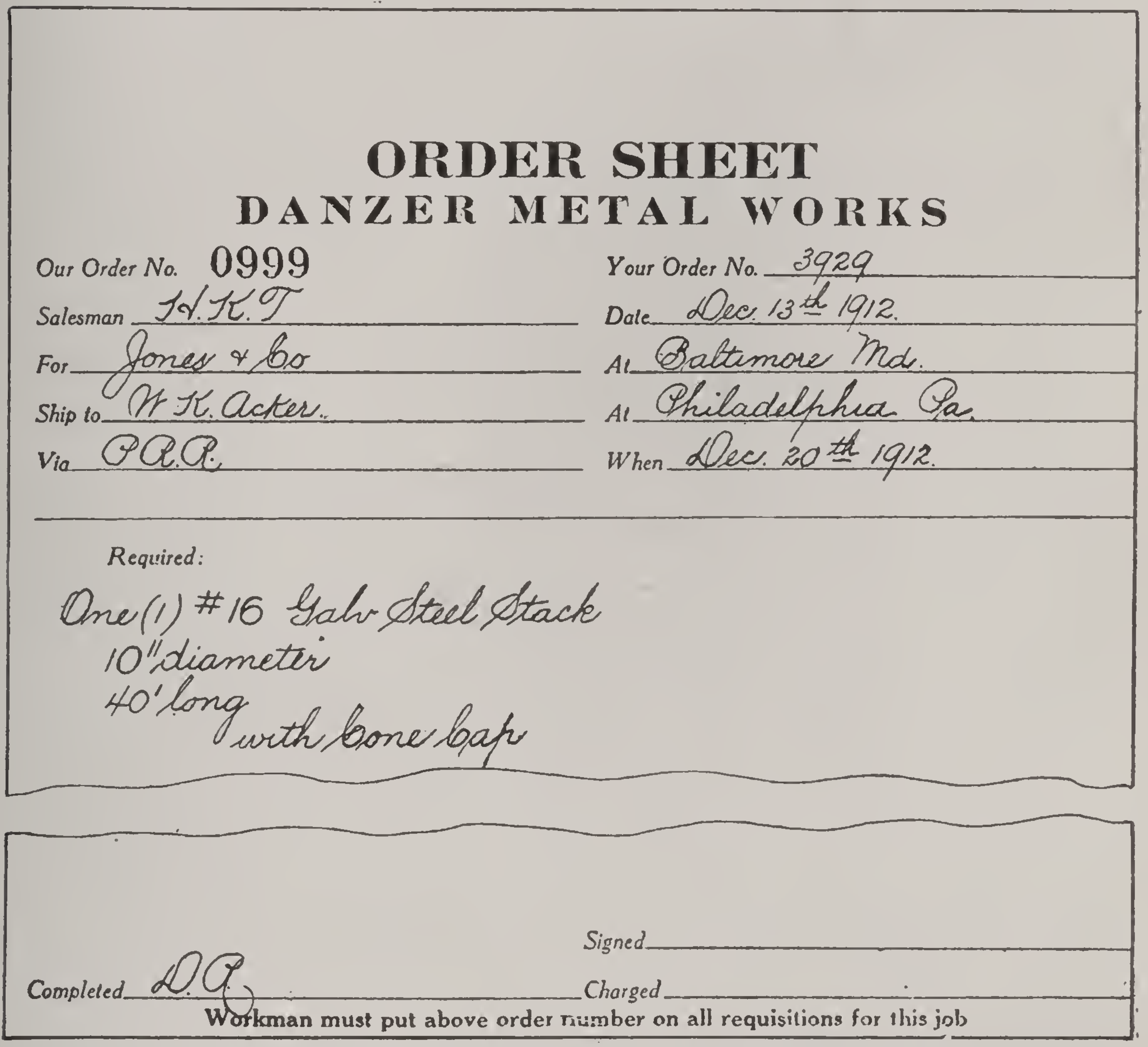
*Secretary Danzer Metal Works, Hagerstown, Md.

gauge galvanized steel, the shop labor item on which amounted to 110 hours. Three weeks later we duplicated this order and built it in 85 hours. In the first case much time was lost on account of the fact that a mechanic let a sheet slip just at the time when the holes for rivets were being marked and as a consequence all the holes had to be rebored by hand after the tank was partly assembled.



ORDER SHEET
DANZER METAL WORKS

Our Order No. 0999
Your Order No. 3929
Salesman H.K.T
Date Dec. 13th 1912.
For Jones & Co
At Baltimore Md.
Ship to W. K. Acker.
At Philadelphia Pa.
Via P.R.R.
When Dec. 20th 1912.

Required:

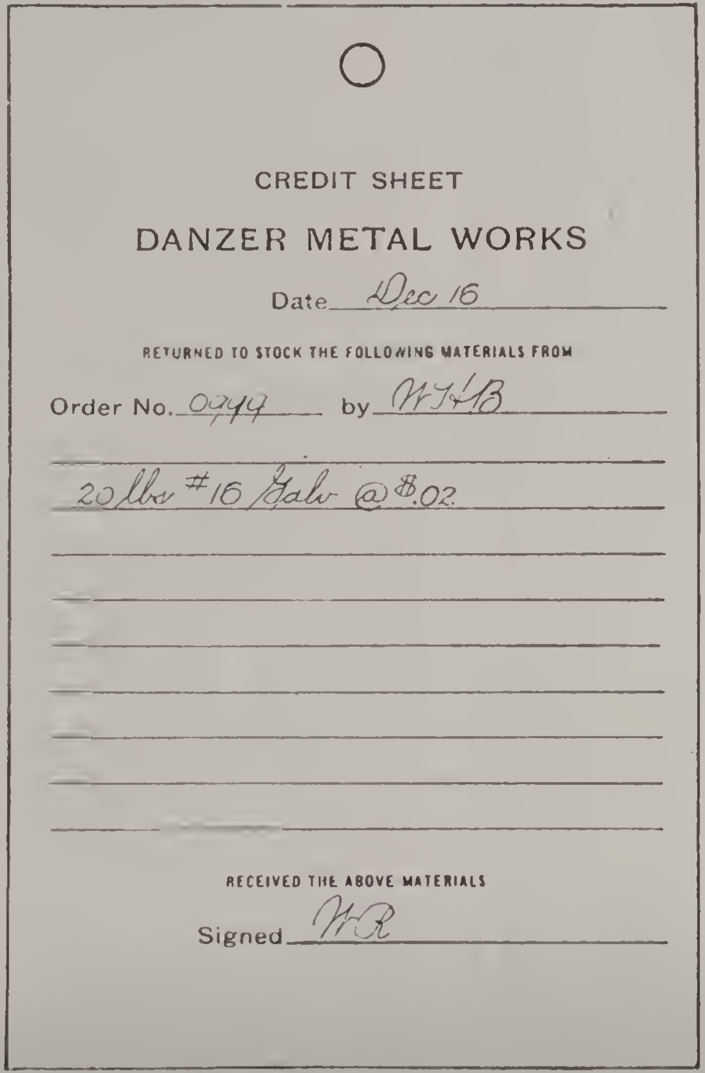
One (1) #16 Galv Steel Stack
10" diameter
40' long
with Cone Cap

Signed
Completed D.Q.
Charged

Workman must put above order number on all requisitions for this job

Fig. 1—Orders are Made Out in Triplicate, One for the Shop Foreman, the Second for the Bookkeeper, the Third for the Stockkeeper

Having considered the labor question, the next thing to discuss is Raw Material. This, of course, includes such things as tin plate, galvanized stock, and, although a matter open to discussion, we think solder should be included with this. To obtain exact facts regarding this part of the system is simple, for it is assumed that every business man will have before him at least a card index system, in



CREDIT SHEET

DANZER METAL WORKS

Date Dec 16

RETURNED TO STOCK THE FOLLOWING MATERIALS FROM

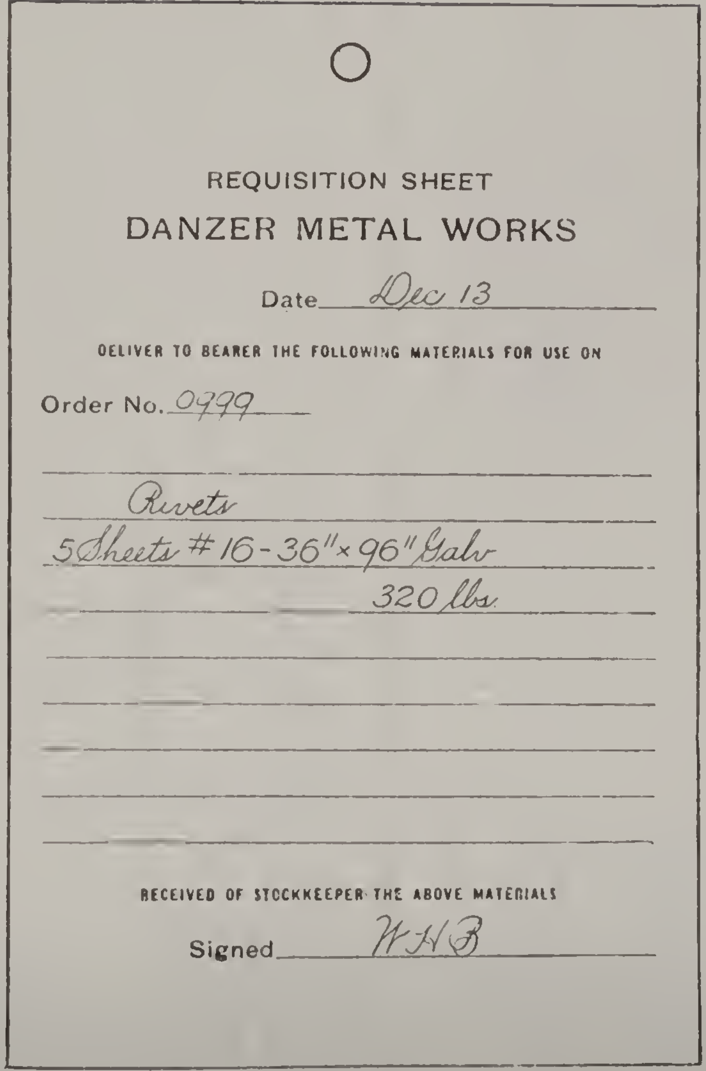
Order No. 0944 by WHB

20 lbs #16 Galv @ $.02

RECEIVED THE ABOVE MATERIALS

Signed WR

Fig. 4—Credit Sheet



REQUISITION SHEET

DANZER METAL WORKS

Date Dec 13

DELIVER TO BEARER THE FOLLOWING MATERIALS FOR USE ON

Order No. 0999

Rivets

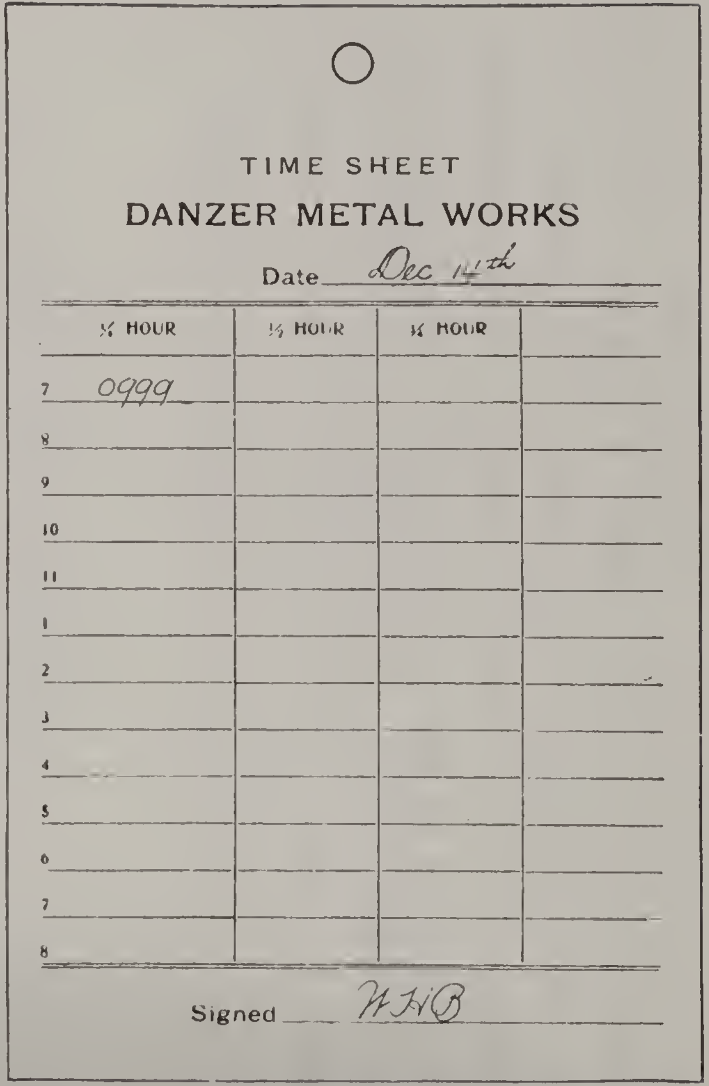
5 Sheets #16-36"×96" Galv

320 lbs

RECEIVED OF STOCKKEEPER THE ABOVE MATERIALS

Signed WHB

Fig. 2—Requisition Sheet



TIME SHEET

DANZER METAL WORKS

Date Dec 14th

	¼ HOUR	½ HOUR	¾ HOUR	
7	0999			
8				
9				
10				
11				
1				
2				
3				
4				
5				
6				
7				
8				

Signed WHB

Fig. 5—Workman's Daily Time Sheet

which he notes the cost of all raw materials and merchandise he buys, and he should also note along with it the present market price of the article or stock. We make this notation in red ink on the same card, entering the actual cost which we have paid in black. This we correct and revise weekly and oftener if needed.

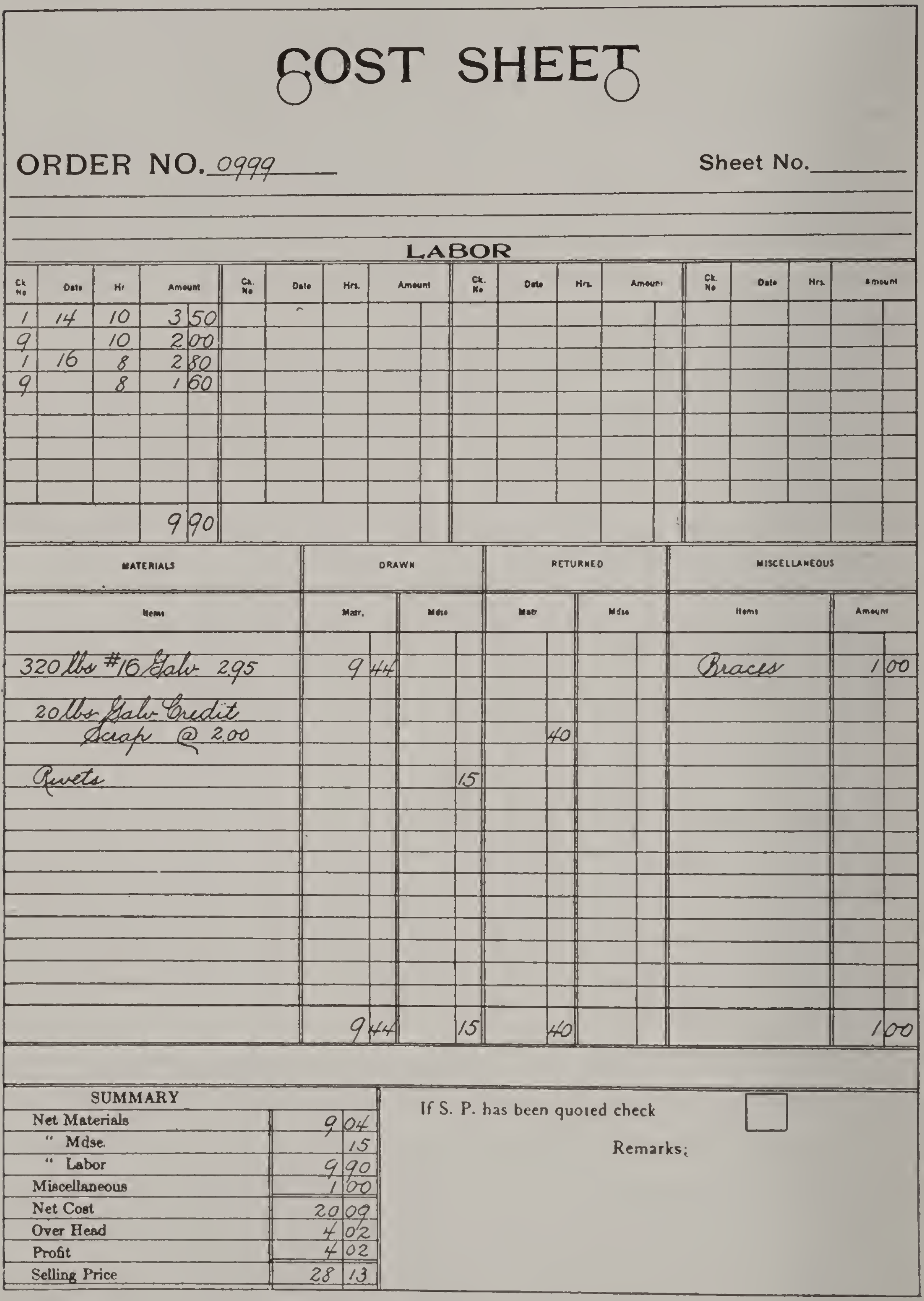
The next item to consider is Merchandise, and under it we choose to consider all manufactured products which we buy ready for resale, such as gutters, conductors, elbows, shanks, circles and the large number of other items that come under that head.

The next consideration is that of Miscellaneous, embracing such items as work done outside of our own shop in connection with any contract, the car fare and board, if work is erected out of the city, freight to deliver goods, if any, drayage and the numerous other items not chargeable to any of the other classes noted in the foregoing.

The last item for consideration, although by far not the least, is that of ''Overhead'' or ''Burden.'' This has been neglected too frequently, and as a consequence some otherwise prosperous business man has been driven to the wall although a hard worker and an otherwise careful business man. This percentage of Overhead must be known beforehand with our system. A simple way to do this, and the way we figure ours about every third year, is to keep the net cost on all the sales and contracts, and, deducting this total from the total amount of sales, we have the gross profit.

Then by closing our books at the end of the fiscal year we arrive at our net profit. Having the net and gross profits before us, and knowing the net cost, it is a simple arithmetical calculation to arrive at the percentage of overhead to be added to the net cost so that the net profits will equal the net profit as shown by the books.

For example, suppose the net cost on all our contracts is $20,000 and our gross receipts for these are $28,000, giving a gross profit of $8000. On closing the books we find our net profit amounts to $3000. The difference between the gross profit, $8000, and the net profit, $3000, is $5000. This $5000 then represents the Overhead, and



COST SHEET

ORDER NO. 0999 **Sheet No.** ______

LABOR

Ck No	Date	Hr	Amount	Ck. No	Date	Hrs.	Amount	Ck. No	Date	Hrs.	Amount	Ck. No	Date	Hrs.	Amount
1	14	10	3 50												
9		10	2 00												
1	16	8	2 80												
9		8	1 60												
			9 90												

MATERIALS	DRAWN		RETURNED		MISCELLANEOUS	
Items	Matr.	Mdse	Matr	Mdse	Items	Amount
320 lbs #16 Galv 2.95	9 44				Braces	1 00
20 lbs Galv Credit Scrap @ 2.00			40			
Rivets		15				
	9 44	15	40			1 00

SUMMARY	
Net Materials	9 04
" Mdse.	15
" Labor	9 90
Miscellaneous	1 00
Net Cost	20 09
Over Head	4 02
Profit	4 02
Selling Price	28 13

If S. P. has been quoted check ☐

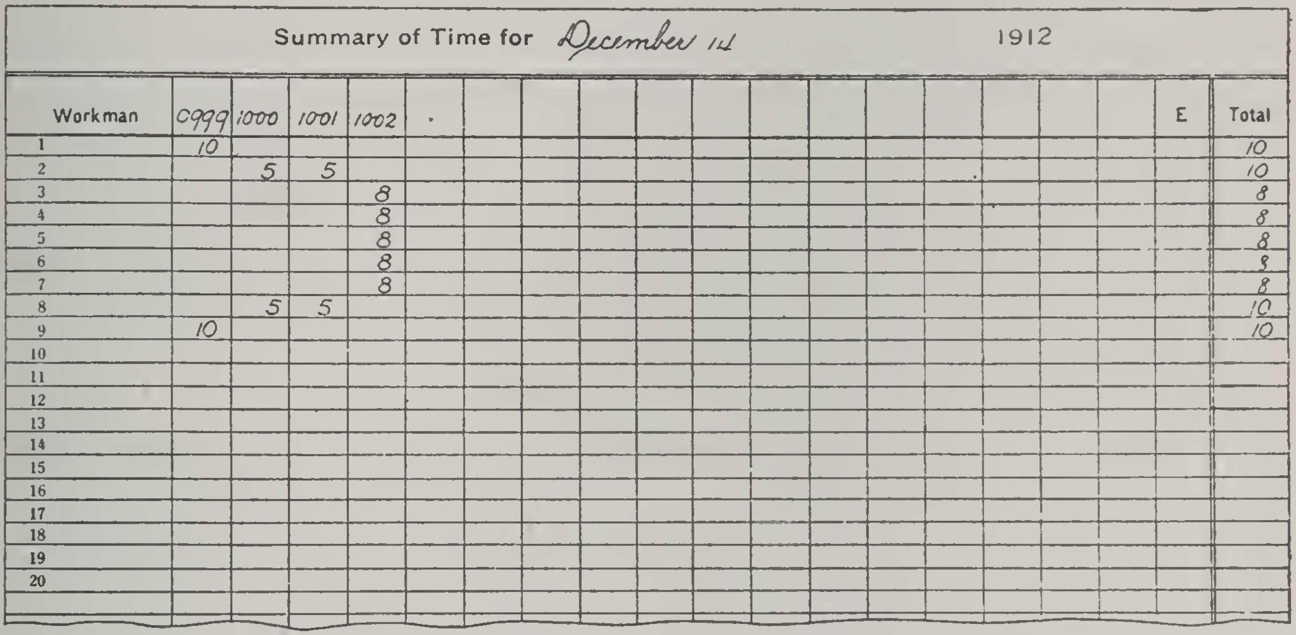
Remarks:

Fig. 3—Completed Cost Sheet

means that it cost us $5000 for overhead expenses while we were executing contracts which cost us $20,000. This means that our overhead expense is $5000 for every $20,000 cost, or the Overhead is 25 per cent. of the cost.

Having these facts before us, let us endeavor to demonstrate their application as we tried them out in a practical manner in our own factory.

First, all our order forms are made in triplicate, green, golden rod and pink. The original is reproduced in Fig. 1. When an order is received it is given a number and then made in triplicate by carbon sheets placed between the leaves. When this order has been made out as shown in Fig. 1 and properly signed by the order clerk who makes it out, it is ready to go through the shop. The green sheet, or original, is given to the foreman, who delivers it to the particular workman who is to lead off the work on this job. The name of that workman is entered on the face of the pink sheet by the bookkeeper, which pink sheet is to stay in the office as the accounting copy. The second copy, or golden rod sheet, is sent to the stockkeeper that he may know at all times for what any material is being requisitioned.



Summary of Time for December 14 1912

Workman	0999	1000	1001	1002														E	Total
1	10																	10
2		5	5															10
3				8														8
4				8														8
5				8														8
6				8														8
7				8														8
8		5	5															10
9	10																	10
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

Fig. 6—Time Summary Sheet, Showing Record of Workmen's Time on Four Separate Orders

The workman designated to lead off with this job then, with the assistance of the foreman, issues a Requisition Sheet as shown in Fig. 2 for such material as he may need for the job. If after the work is in progress this workman finds he needs more material he issues another Requisition Sheet or as many as he may need during the process of the job. These are carried or sent to the stockkeeper, who delivers the goods called for, making the proper notations as to weight, amount, etc., on this sheet, checks them off and enters them in a Perpetual Inventory or Daily Inventory if such is kept, although it is in a measure superfluous, and it is then sent to the office to be charged against that job on the Cost Sheet.

This brings us to the Cost Sheet. This is shown in Fig. 3, and contains the Order No., the Sheet No., a few lines for notation if desired, and then a ruling to take care of Labor. We rule four sets across the page, each set being divided as follows: First, a line for the clerk or workman's number; second, for the date; third, for the number of hours he has put in on the job on that date, and fourth, for the amount of this labor figured at the rate per hour of that particular workman.

Then we have another ruling below for material used on the job. First, the description of the item, then the ruling for the cost of same under Raw Material or Merchandise, as the case may be. These costs are acquired from the card index system noted in the foregoing. Then a ruling for Raw Material or Merchandise returned, which is accomplished by means of the Credit Sheet shown in Fig. 4. This sheet explains itself, the workman merely taking any material left from the job at its completion to the stockkeeper, who issues the Credit Sheet, signs it, enters it on the Daily Inventory, if one is kept, and sends it to the office to be credited on the Cost Sheet.

Our method of obtaining Labor is by means of the Time Sheet shown in Fig. 5. This sheet is very simple; all that is required of a workman is to enter in the quarter hour space the number of the job opposite the hour when he starts it and the next number opposite the hour when the next job is begun. These are returned each evening to the office, where they are entered on the Summary Sheet shown in Fig. 6. The numbers of the several jobs in the shop on that particular day are entered in the small squares at the top. Each workman being known by number in the office only, the number of hours they work on any particular job is entered opposite their number and under the correct job number, the entire number of hours being carried to the total column and from this is compiled the weekly payroll.

The letter E on the Summary Sheet designates Expense not chargeable to any specific job.

If a Daily Inventory is kept the Credit, Requisition and Time Sheets need not be filed, since the first two are taken care of by the entries in the Daily Inventory and Labor is entered each day on the Summary Sheet.

The Miscellaneous columns cover the items noted before and all these should be entered with a brief description and the cost.

Then comes the summary, space for which is provided on the cost sheet. First bring down the total Raw Material, less any Returned, and in the same manner the Merchandise then the total Labor and after that the Miscellaneous total. By adding these we get the net cost, adding the overhead, the manner of acquiring which has been explained above, and after that the profit, the grand total being the Selling Price. If the Selling Price has been quoted we check in the block near the lower right-hand corner, this serving as a direct check on the estimator in the shop, telling immediately if he is estimating on the safe side.

Now for a practical demonstration. Suppose Jones & Co., Baltimore, Md., sends us an order for shipment to W. K. Acker, Philadelphia, Pa., consisting of one 16 gauge galvanized stack, with cone top, 10 inches in diameter, 40 feet long. The foreman receives the order and delivers it to workman No. 1, who with the assistance of a helper No. 9 makes a requisition as shown for Rivets and 5 sheets, No. 16 gauge, 36 inches x 96 inches. This the stockkeeper weighs and delivers to him, marking the weight, 320 pounds, on the sheet.

This after going through the regular process is sent with others to the office in the evening. It is then charged on the Cost Sheet of that particular job, as shown, assuming the base price on No. 28 gauge galvanized to be $3.50 f.o.b. Pittsburgh, at $2.95 per hundred pounds; $9.44 under Raw Material.

At the same time these two workmen return their Time Cards showing that they have each put in ten hours on order No. 0999. These are respectively charged against Labor on the Cost Sheet, and the next day, finding they turn in eight hours each on this same job, it is again charged to Labor. But they then return 20 pounds galvanized left from the job and this must be credited in the proper place provided. Also, it was necessary to have a blacksmith make the braces for the cone top, which we must charge as Miscellaneous, at a cost of $1.

The totals are carried down less any credits and added, making the net cost. Adding to this the overhead, which we will assume to be 20 per cent. and a desired profit of 20 per cent., we have the Selling Price of $28.13. To the right may be found room for any remarks one may wish to enter for future reference.

These orders are charged when all three sheets of that order reach the office—the workman having signed his sheet and stockkeeper his at completion. They are then filed in a vertical file for future reference, together with the Cost Sheets, and are all filed numerically.

Another important factor is the value of scrap returned from a job. This can only be reckoned and varies according to conditions and must be left entirely to the judgment of the stockkeeper, who must be competent. If this can not be done, the best plan is to set a fixed allowance price for scrap returned, which must be based on the average value of such material, always taking into consideration that Merchandise and full sheets of Raw Material are returnable at the actual cost charging price.

A careful study of this system will show the simplicity of it as compared with the greater number of systems being established by auditors and certified accountants, as in fact the greater number of such systems are so full of red tape and impossibilities that they are treated as jokes.

We are using this system at present in our factory here with excellent results. Our manufactured articles comprise practically everything in the sheet metal business. A careful use of this system has enabled us to keep a close watch on the cost of all articles made in our shops. It has enabled us to turn out our galvanized snow brakes at a known cost which varies so slightly that we can quote prices that always get business. It has been instrumental in assisting us to quote prices on skylights, metal tanks, blower pipe systems that seldom ever fail to land the orders, and at a fair profit.

We feel that when we have completed a piece of work we know exactly what the piece of work represents and we know that if we do not get more than that amount for it we are doing business at a loss, an item which if more sheet metal contractors knew would save a great many business failures. In addition to the items mentioned in the foregoing, we make all kinds of cornice work, particularly in copper, coverings for fire-proof doors, in tin or galvanized, besides our line of tinners' tools, all of which are carried through our plant with the above system under our close supervision, and we feel sure that we are getting honest results from it.

SHEET METAL SHOP COST-KEEPING SYSTEM

Use of Calculagraph to Compute Automatically Time Consumed on Job—Suggestions Asked on System Adopted for Outside Work

By E. Gunther

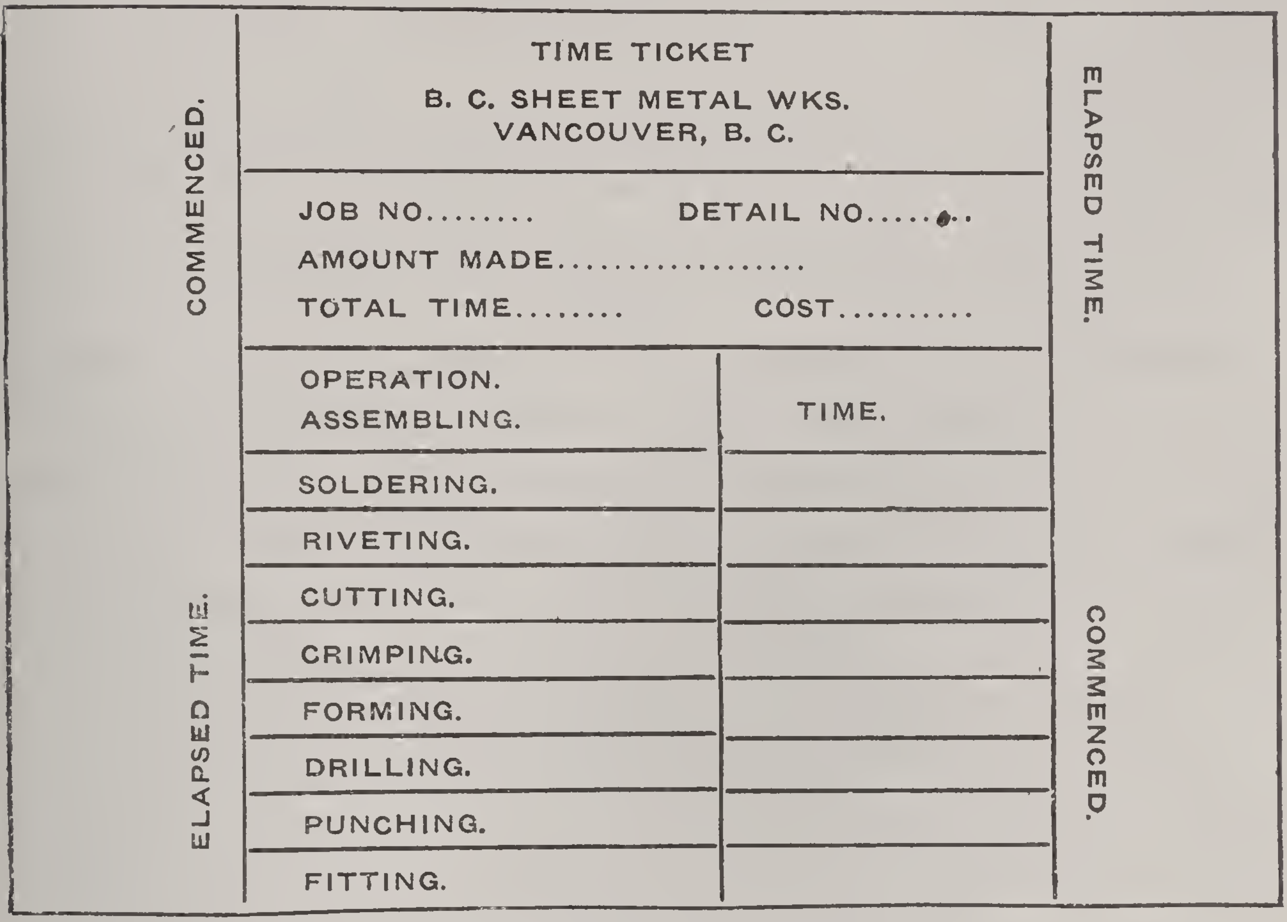
In regard to the article giving a cost-keeping system for a sheet metal shop, by Roy F. Danzer, in the January 3 issue of *Metal Worker, Plumber and Steam Fitter,* I wish to state that I believe it is about the best system ever published in *Metal Worker, Plumber and Steam Fitter,* or in any other trade journal, as I have been a close reader of these.

I would like to ask Mr. Danzer how he keeps track of his outside labor in his erecting work and if he keeps separate cost sheets for different kinds of work done on the same job, such as cornices, skylights, windows, etc.

I was recently with a shop in which I had charge of both time and stock delivered to outside jobs such as solder, sheets, etc. I had a clock which stamped the exact time when I started a man on the job and I had the material to be used all figured out. With this system the man did not need to take care of his time or figure his stock. It was placed before him before he got through with his last job. Any material returned was credited on a slip by myself.

In connection with the foregoing work, I did detailing, all the cutting, and was able to keep a clear account of all material and labor.

The time ticket we used is as shown in the accompanying illustration. It records the kind of labor a man is doing so as to show just where the time is really taken. In this way improvements can be figured on in the way of cutting down the time if the card shows too much is being taken on any particular part of the work. If a man is soldering brackets the amount of work he does on them in a given time is shown.



COMMENCED.

ELAPSED TIME.

TIME TICKET

B. C. SHEET METAL WKS.
VANCOUVER, B. C.

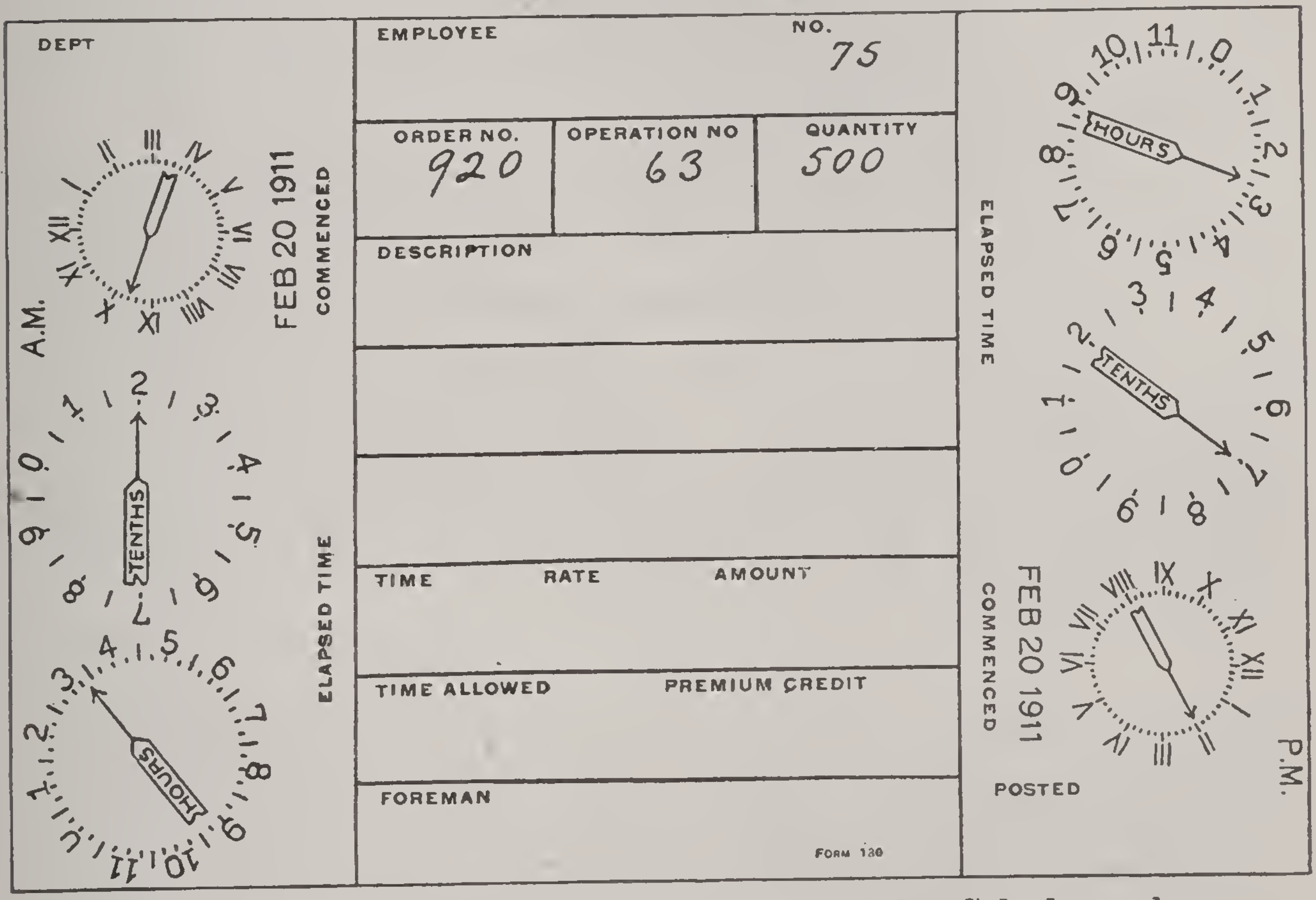
JOB NO........ DETAIL NO.......
AMOUNT MADE..................
TOTAL TIME........ COST..........

OPERATION. ASSEMBLING.	TIME.
SOLDERING.	
RIVETING.	
CUTTING.	
CRIMPING.	
FORMING.	
DRILLING.	
PUNCHING.	
FITTING.	

ELAPSED TIME.

COMMENCED.

Time Ticket for Shop Use



DEPT

A.M.

FEB 20 1911
COMMENCED

ELAPSED TIME

EMPLOYEE

NO. 75

ORDER NO.	OPERATION NO	QUANTITY
920	63	500

DESCRIPTION

TIME RATE AMOUNT

TIME ALLOWED PREMIUM CREDIT

FOREMAN

FORM 130

ELAPSED TIME

FEB 20 1911
COMMENCED

POSTED

P.M.

HOURS
TENTHS
TENTHS
HOURS

Workmen's Time Card With Time Stamped by Calculagraph

There is a clock manufactured which gives the exact amount of time spent on a job, that is to say the time does not have to be figured as with some clocks. This clock registers the time when the workman starts and when he finishes and automatically shows the time spent on the job.

The figures on the time card reproduced in an accompanying illustration show that workman No. 75 was employed making 500 pieces on order No. 920, performing operation No. 63. The Calculagraph record on the left hand end of card shows that he commenced at 8.48 o'clock a.m. on February 20, 1911. At the end of the morning session he had worked on the job 3.2 hr. The Calculagraph record on the right shows that he commenced work in the afternoon at 1.10 (10 minutes late) and that his working time was 2.7 hr. The total actual working time of man No. 75 on job 920, February 20, was 5.9 hr.

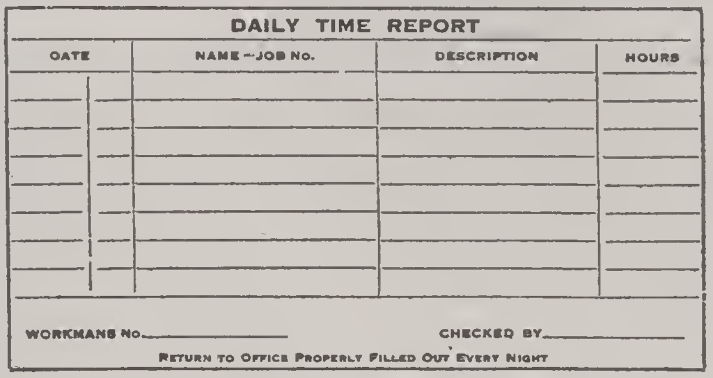
I believe it is a good idea to weigh all finished work and scrap which cannot be used again. When the amount of material taken to the job is known and the amount returned, by weighing the finished products one can arrive at the scrap, also by weighing the total scrap taken away one can get the percentage of scrap per year and so figure on jobs accordingly.

We have had a system of keeping a job number on each contract then, as we called it, a detail number, as cornice No. 1; brackets on same, No. 2; dentils, No. 3; lookouts, No. 4; skylights, No. 5, etc. The time ticket is marked with both as No. 150/1, the first being the job number and the latter the number of the particular work done, for instance cornice, skylight, dentil or some other part.

SHEET METAL COST KEEPING WITH SINGLE BLANK

Form Devised by Michigan Sheet Metal Contractor for Keeping Costs on an Order on One Sheet

Systematic accounting sometimes becomes a burden upon a business because of a too ponderous system of forms and checks, and any method which combines effectiveness with simplicity will meet with general approval. Such a system is in operation in the Kalamazoo Sheet Metal Manufacturing Co., an active association member. This business, as conducted under the able management of its president and treasurer, J. A. Temple, is a good example of the efficacy of good systems of cost computing and the application of sound business principles in the handling of all classes of work. The company has operated this simple method of cost keeping for a considerable time to its entire satisfaction, its efficiency being practically borne out by the prosperous condition of the organization as a whole.



DAILY TIME REPORT

DATE	NAME—JOB No.	DESCRIPTION	HOURS

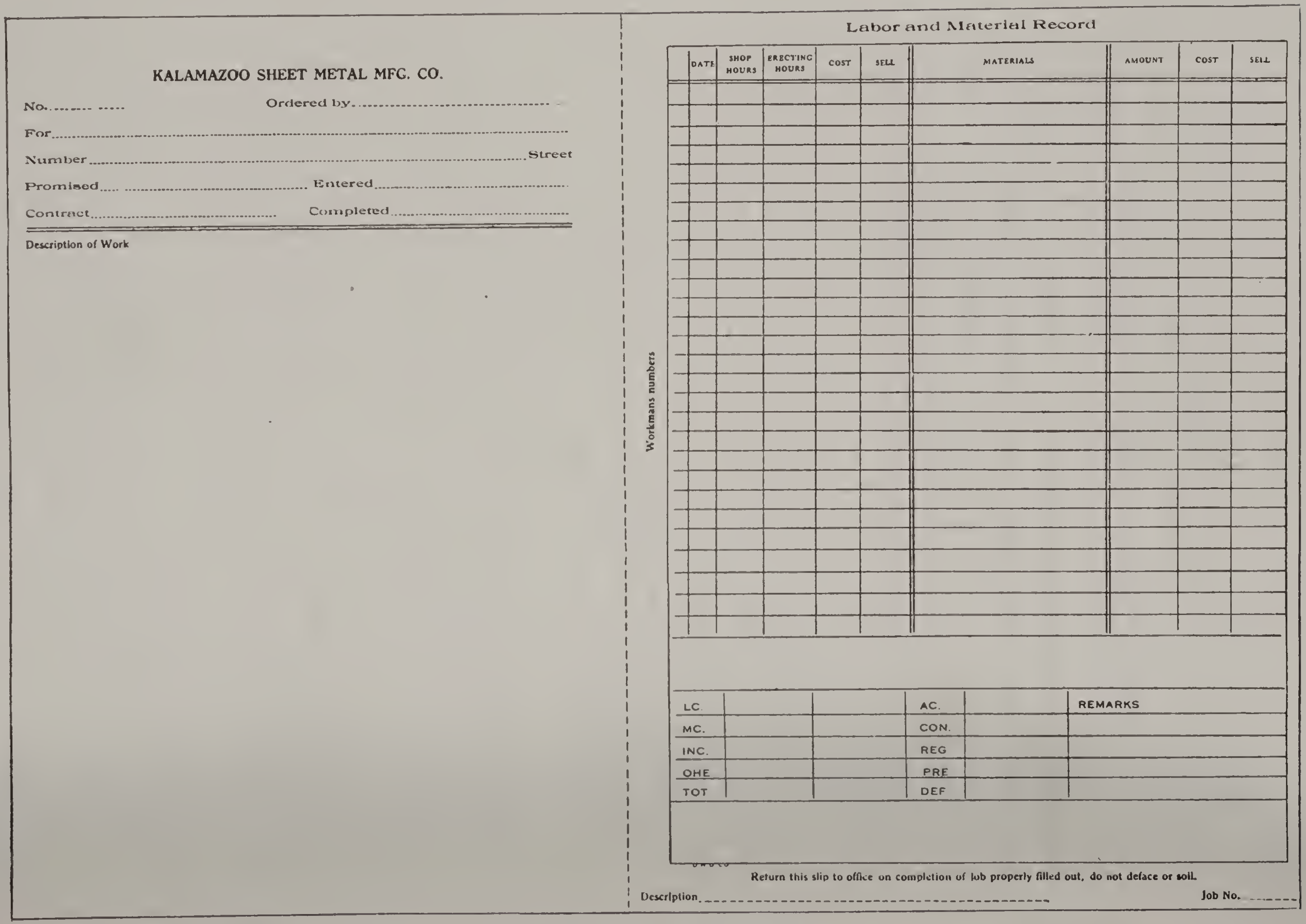
WORKMANS No.________ CHECKED BY________

RETURN TO OFFICE PROPERLY FILLED OUT EVERY NIGHT

Time Card, 3 x 5¼ In.

The estimating and summary sheets used in keeping the costs of all work are quite simple. They were devised by Mr. Temple after a close study of conditions surrounding his shop. The cost sheet used by the company is a combination order, labor and material sheet; in fact, from the receipt of the order to its final disposal all costs

Sheet Metal Cost Keeping With Single Blank



KALAMAZOO SHEET METAL MFG. CO.

No.......... ..... Ordered by....................................

For...

Number..Street

Promised.... .... Entered.............................

Contract................................ Completed..............................

Description of Work

Labor and Material Record

Workmans numbers

DATE	SHOP HOURS	ERECTING HOURS	COST	SELL	MATERIALS	AMOUNT	COST	SELL

					REMARKS
LC.			AC.		
MC.			CON.		
INC.			REG		
OHE			PRE		
TOT			DEF		

Return this slip to office on completion of job properly filled out, do not deface or soil.

Description... Job No...........

Order and Cost Data Blank

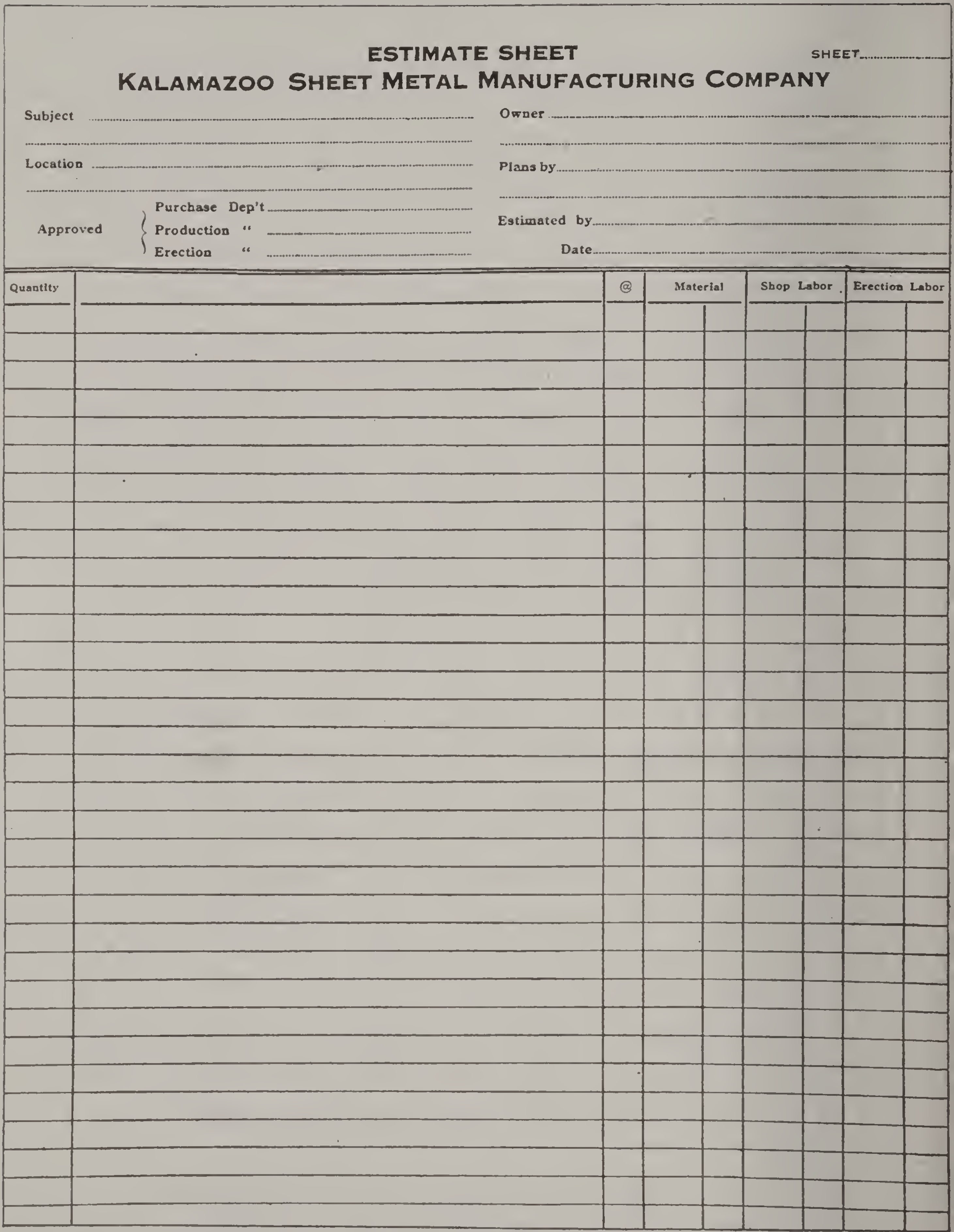
are entered thereon, and as each sheet is numbered there is little chance of the information being mislaid or lost track of as a duplicate is always retained in the order book.

The original and duplicate order sheet is in reality but a single sheet perforated. The sheet as reproduced in an accompanying illustration, shows on one side the order blank and on the other the labor and material record. On the back of the labor and material record there is printed an exact duplicate of the left hand side of the sheet, for this reason. When the order is about to be made out the right half of the sheet is folded beneath the left half, and when a carbon is placed between a carbon copy is made of the original order. This right hand sheet is then torn out and the left hand sheet remains in the order book for future reference. When the books are used up the names of the customers are indexed and the order number affixed opposite the respective names in case of future references that might be needed.

When an order comes into the office it is immediately entered on the order blank and the duplicate turned over to the foreman for its disposal. Whenever necessary, diagrams are also drawn on the same sheet in order that there may be no misunderstanding regarding the exact details of the work required. The majority of contract or jobbing work undertaken by the company is accomplished within thirty days after the receipt of order, so that it is seldom necessary to make out more than one cost slip for one particular job.

Every workman is numbered and is known only by that number in the office. The men's daily time reports have to be turned into the office every night for inspection and charging.

When the bookkeeper receives the time records, the cost sheets are gathered together and the time charged to the respective contracts. By this means it is possible to note daily how all work is progressing. It is also possible



ESTIMATE SHEET SHEET..........

KALAMAZOO SHEET METAL MANUFACTURING COMPANY

Subject ....
Owner ....
Location ....
Plans by ....
Approved { Purchase Dep't .... Production " .... Erection " ....
Estimated by ....
Date ....

Quantity		@	Material	Shop Labor	Erection Labor

Estimate Blank, 8½ x 11, Used in Sheet Metal Work to ascertain to some degree whether a contract can be accomplished in its scheduled time.

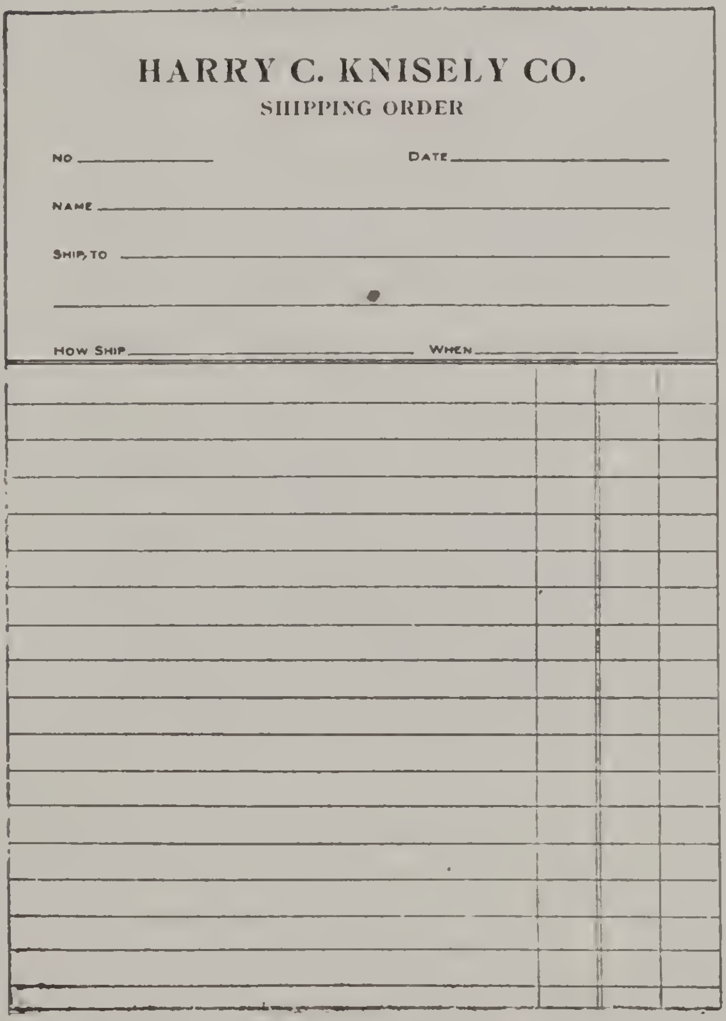
On the labor and material record it will be noticed that both columns are kept separate. On the left the shop hours and erecting hours are entered individually and their cost and selling value computed according to the nature of the work and the time per hour paid to the workman doing it. On the right the materials used are handled the same, one column being devoted to the actual cost and selling price of materials used. The time cards used are simple; all the workman has to do is to fill in his own number, the job number, description of work done, and time taken for its execution.

At the bottom of the sheet the costs are summarized, and from this the exact status of the entire contract can be discerned on comparison with the contract price. The letters LC represent labor cost; MC the material cost; INC incidental expenses; OHE overhead expenses; TOT the expense incurred for the completion of the work. AC represents the actual cost; CON the contract price; REG the regular selling price; PRE premium on the job, if any; DEF deficiency on the job, if any. So that at a glance it is possible to check the estimated and actual costs of all phases of the work and the estimator can see where he has charged too much or too little on any particular items and thereby protect himself in future on subsequent contracts.

SIMPLE COST SYSTEM FOR SHEET METAL SHOP

Blanks Used for Keeping Cost on Individual Orders—Time Cards on Which Men Enter Their Own Time

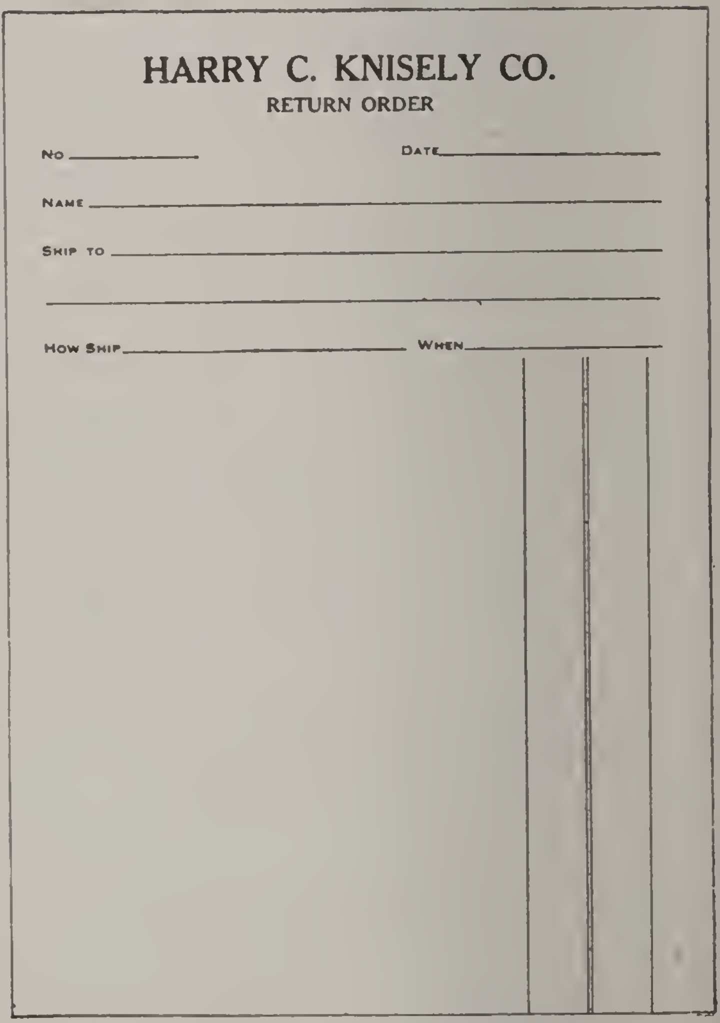
The cost system successfully maintained by the Harry C. Knisely Co., Chicago, has been adapted to the systematic workings of the organization after careful consideration as to overhead and the general costs of doing business. The company undertakes mostly contract work and when a price has been made, the superintendent is informed as to the figure and he endeavors to produce the highest class of work at the lowest possible price.



HARRY C. KNISELY CO.
SHIPPING ORDER

No ________ Date ________
Name ________
Ship to ________
How Ship ________ When ________

Shipping Order Blank; Made in Duplicate

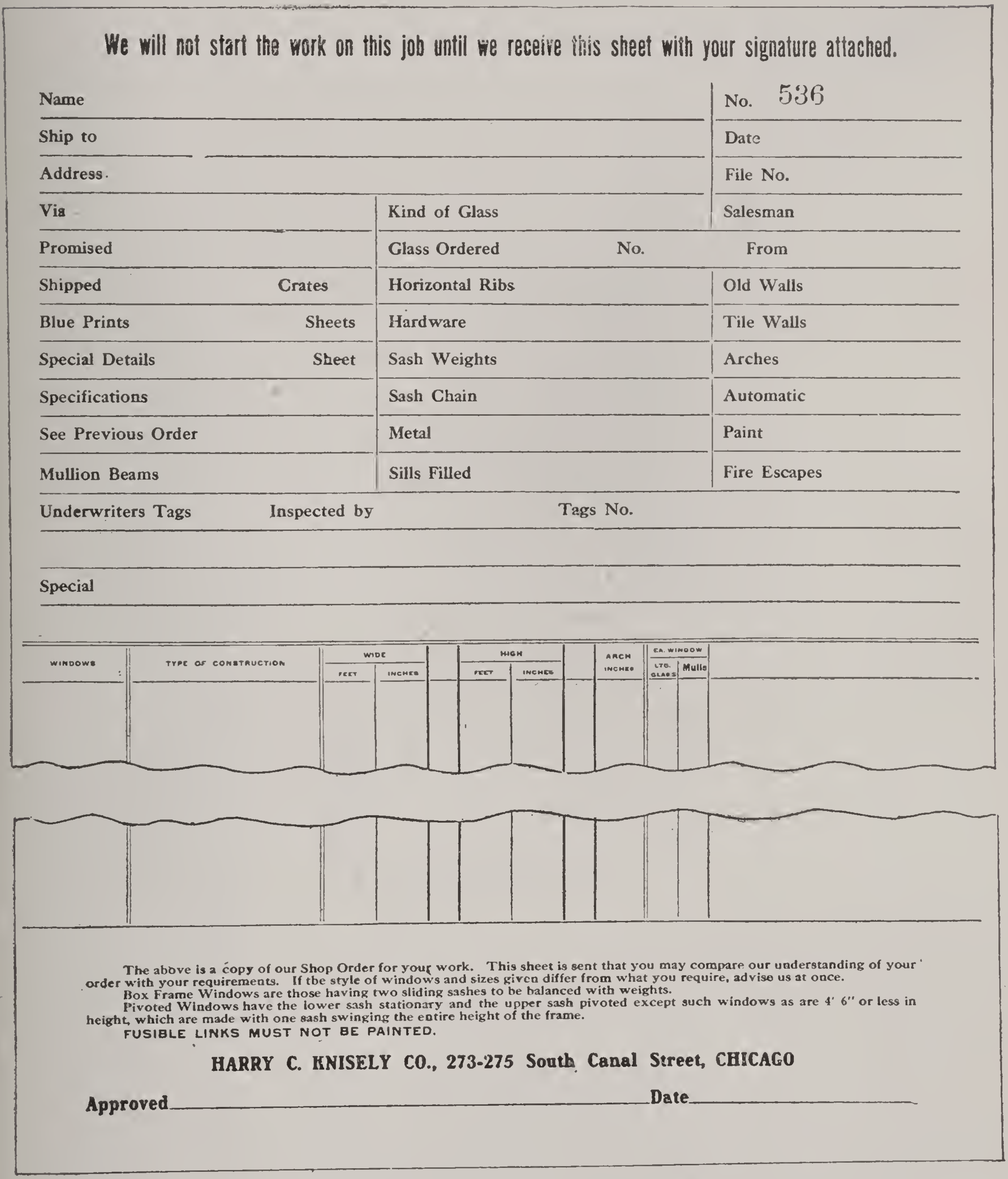


HARRY C. KNISELY CO.
RETURN ORDER

No ________ Date ________
Name ________
Ship to ________
How Ship ________ When ________

Return Order Slip; a Credit Item for Stockkeeper

When an order is received it is immediately entered on one of the order sheets, shown in the accompanying illustration. The majority of the company's orders are for fireproof windows, and when an order is made out on the special sheet for windows all particulars are filled in. At



We will not start the work on this job until we receive this sheet with your signature attached.

Name		No. 536
Ship to		Date
Address		File No.
Via	Kind of Glass	Salesman
Promised	Glass Ordered No.	From
Shipped Crates	Horizontal Ribs	Old Walls
Blue Prints Sheets	Hardware	Tile Walls
Special Details Sheet	Sash Weights	Arches
Specifications	Sash Chain	Automatic
See Previous Order	Metal	Paint
Mullion Beams	Sills Filled	Fire Escapes

Underwriters Tags Inspected by Tags No.

Special

WINDOWS	TYPE OF CONSTRUCTION	WIDE			HIGH			ARCH	EA. WINDOW		
		FEET	INCHES		FEET	INCHES		INCHES	LTG. GLASS	Mulls	

The above is a copy of our Shop Order for your work. This sheet is sent that you may compare our understanding of your order with your requirements. If the style of windows and sizes given differ from what you require, advise us at once.

Box Frame Windows are those having two sliding sashes to be balanced with weights.

Pivoted Windows have the lower sash stationary and the upper sash pivoted except such windows as are 4' 6" or less in height, which are made with one sash swinging the entire height of the frame.

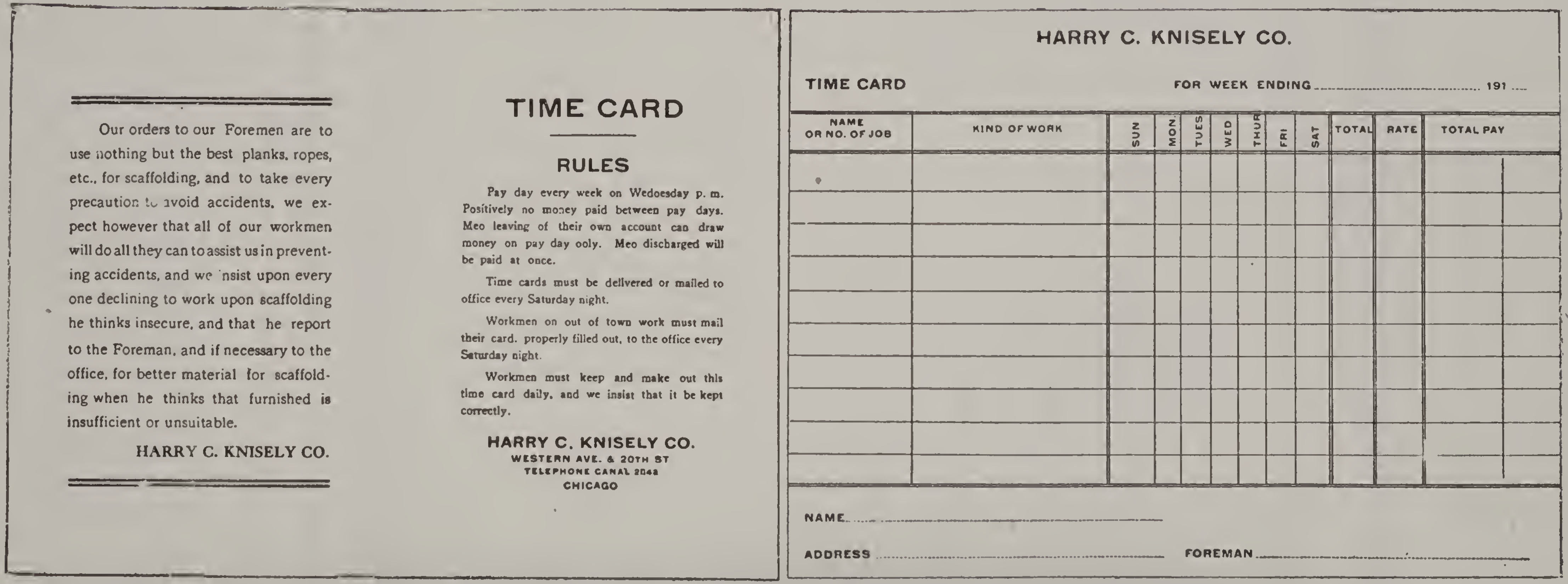
FUSIBLE LINKS MUST NOT BE PAINTED.

HARRY C. KNISELY CO., 273-275 South Canal Street, CHICAGO

Approved________________ **Date**__________

Order Sheet; No Work is Started Until This Order Has Been Signed

the head of the sheet the wording reads, "We will not start the work on this job until we receive this sheet with your signature attached." A copy of the order sheet is



Our orders to our Foremen are to use nothing but the best planks, ropes, etc., for scaffolding, and to take every precaution to avoid accidents, we expect however that all of our workmen will do all they can to assist us in preventing accidents, and we insist upon every one declining to work upon scaffolding he thinks insecure, and that he report to the Foreman, and if necessary to the office, for better material for scaffolding when he thinks that furnished is insufficient or unsuitable.

HARRY C. KNISELY CO.

TIME CARD

RULES

Pay day every week on Wednesday p. m. Positively no money paid between pay days. Men leaving of their own account can draw money on pay day only. Men discharged will be paid at once.

Time cards must be delivered or mailed to office every Saturday night.

Workmen on out of town work must mail their card, properly filled out, to the office every Saturday night.

Workmen must keep and make out this time card daily, and we insist that it be kept correctly.

HARRY C. KNISELY CO.
WESTERN AVE. & 20TH ST
TELEPHONE CANAL 2048
CHICAGO

HARRY C. KNISELY CO.

TIME CARD FOR WEEK ENDING .... 191 ...

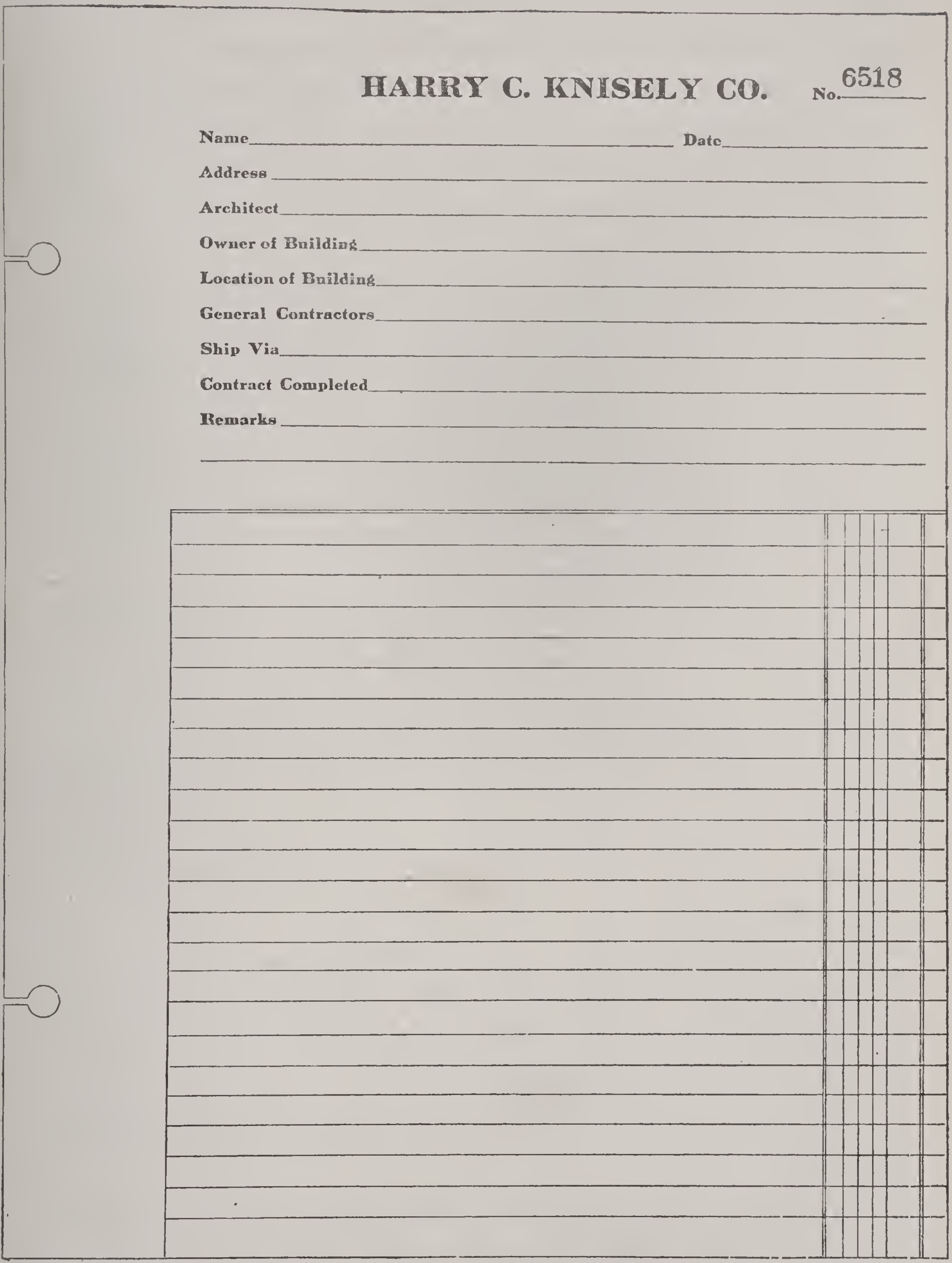
NAME OR NO. OF JOB	KIND OF WORK	SUN	MON	TUES	WED	THUR	FRI	SAT	TOTAL	RATE	TOTAL PAY

NAME ....

ADDRESS .... FOREMAN ....

Time Card for Workmen; To be Filled Out Under Supervision of Foreman

Simple Cost System for Sheet Metal Shop



HARRY C. KNISELY CO. No. 6518

Name ____________ Date ____________

Address ____________

Architect ____________

Owner of Building ____________

Location of Building ____________

General Contractors ____________

Ship Via ____________

Contract Completed ____________

Remarks ____________

Summary Sheet Filled Out on Completion of Job sent either to the owner or architect, and on his signature of approval the work is commenced. This protects the company regarding the possibility of mistakes. The pertinent wording at the bottom of the sheet is also interesting, inasmuch as there can be no misunderstanding between the customer and contractor. When everything is settled the superintendent takes charge of one order slip until the work is completed and the other is kept in the office.

When materials are needed a shipping order, as shown herewith, is made out and turned in to the stockkeeper. These are made out in duplicate, the foreman holding one and the other being retained by the stockkeeper. The latter is supposed to turn his slips in to the office each night so that the costs can be posted and the final cost sheet be kept posted daily. The return order slips are handled in the same way.

The time cards of the form shown in an accompanying illustration are filled out by the workmen, under the supervision of the foreman in the shop. Time cards are turned in to the office in order that the exact costs may be computed on the summary sheet, also reproduced in an accompanying illustration.

On the reverse of the time card are printed the following rules:

Pay day every week on Wednesday p. m. Positively no money paid between pay days. Men leaving of their own account can draw money on pay day only. Men discharged will be paid at once.

Time cards must be delivered or mailed to office every Saturday night.

Workmen on out of town work must mail their card, properly filled out, to the office every Saturday night.

Workmen must keep and make out this time card daily, and we insist that it be kept correctly.

INSTRUCTIONS TO MINIMIZE ACCIDENTS

On the same side of the time card there appears the following:

Our orders to our foremen are to use nothing but the best planks, ropes, etc., for scaffolding, and to take every precaution to avoid accidents. We expect, however, that all our workmen will do all they can to assist us in preventing accidents, and we insist upon every one declining to work upon scaffolding he thinks insecure, and that he report to the foreman, and if necessary to the office, for better material for scaffolding when he thinks that furnished is insufficient or unsuitable.

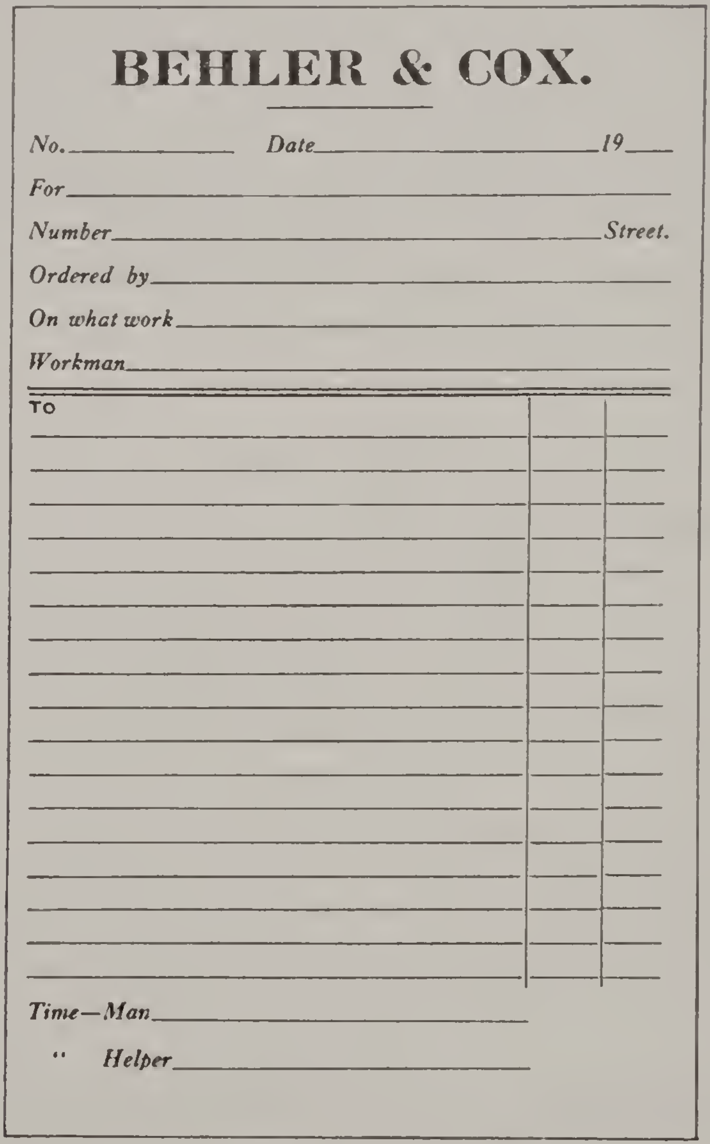
When the job is finished and all costs have been entered, a final summary is made to see whether there has been a profit or loss on the execution of the contract. All costs are totaled, and on to that is added the cost of overhead expense. The total is deducted from the contract price and the actual profit is determined.

LIVE METHODS OF A MICHIGAN METAL WORKER

Methods of Cost Keeping Successfully Used by a Middle Western Sheet Metal Works

A WELL-DEVISED system of shop accounts is shown in the accompanying reproductions of slips and cards used by the H. F. Cox Co., Grand Rapids, Mich.

Three slips are used in maintaining the correct costs of materials and labor. The receipt of an order necessitates the making out of a regular order sheet in duplicate, one being retained by the office and the other by the superintendent or workman in charge of the job. For small transactions the entire costs can be listed on this



BEHLER & COX.

*No.*________ *Date*______________*19*___

*For*____________________

*Number*________________*Street.*

*Ordered by*________________

*On what work*______________

*Workman*__________________

TO		

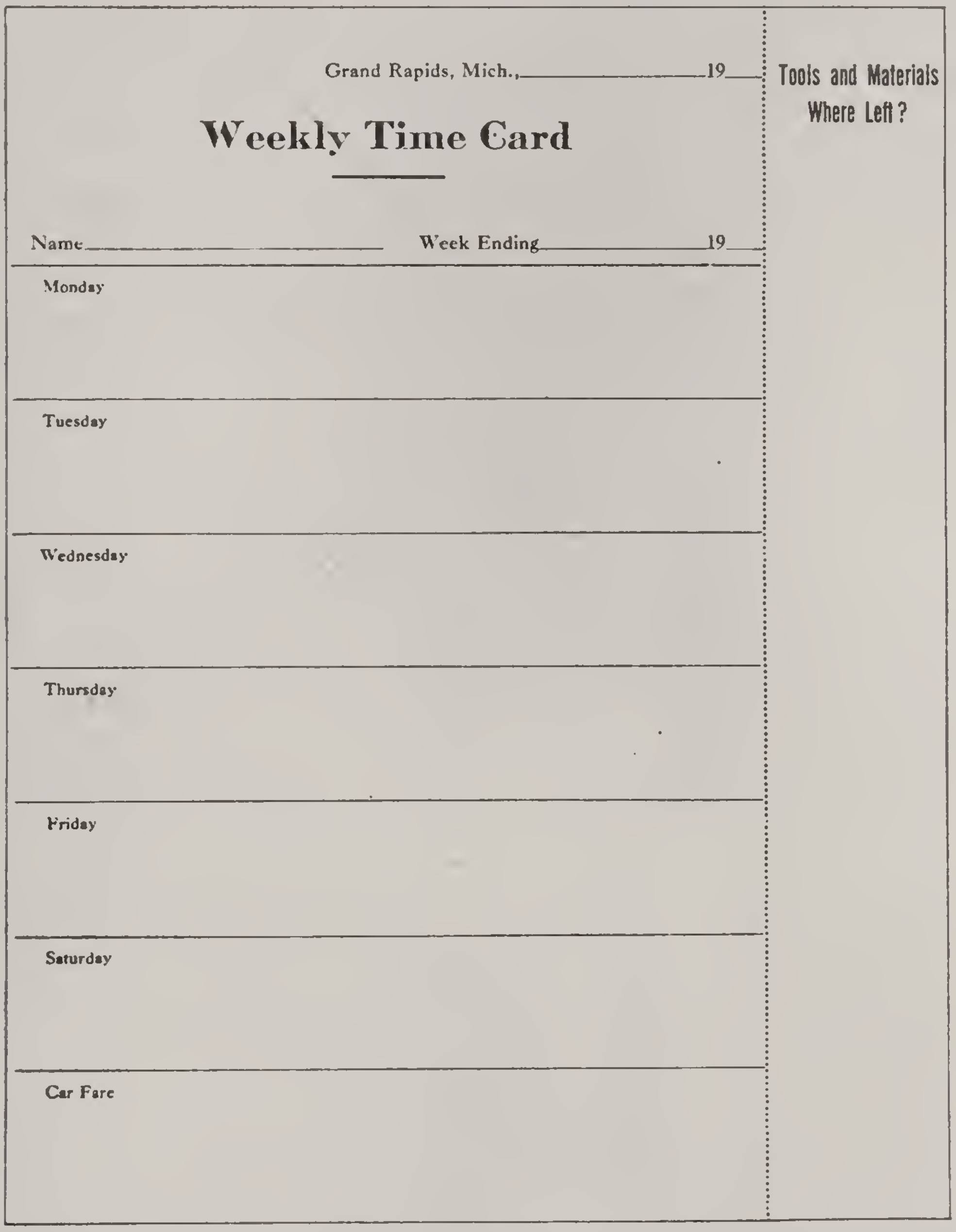
*Time—Man*________________

" *Helper*________________

Duplicate Order Sheet

sheet, including the time of the workman and helper, space for which has been provided at the bottom of the sheet. Each order is numbered consecutively so that the records may be kept numerically right and easy to find for reference.

The material slip is used for materials sent and returned from a job. When goods are to be sent out, the order number and customer's name are entered in their respective places. The workman taking the materials signs his name in the space allotted for that purpose, and the checker also signs his name likewise. All goods sent out are entered in the first column, the amounts used and returned are entered in the second and third columns respectively. All returned materials are checked in the



Grand Rapids, Mich.,__________19__

Weekly Time Card

Name__________ Week Ending__________19__

Monday

Tuesday

Wednesday

Thursday

Friday

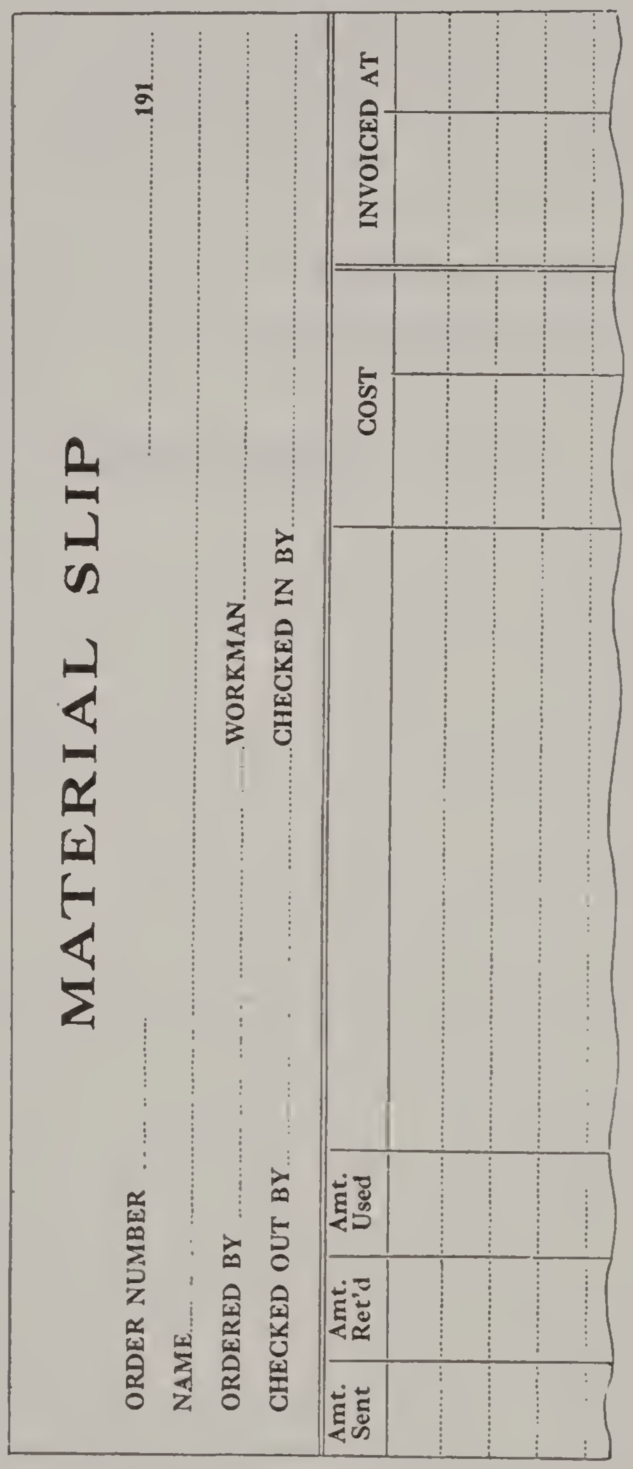
Saturday

Car Fare

Tools and Materials Where Left?

Weekly Time Card and Record of Tools and Materials Used same manner as those going out so that account may be kept as to the amount of material used on each job.

The actual costs are entered under the cost column and the amount to be charged the customer in the final column. The weekly time card is printed so that the week's time may be entered on one slip. Car fares and incidentals incurred by the workmen are entered at the bottom of the slip, and information as to the character of materials and tools left at jobs occupies the right-hand column. This comprises the complete cost sheets used.



MATERIAL SLIP

ORDER NUMBER .... 191...

NAME........

ORDERED BY .... WORKMAN........

CHECKED OUT BY .... CHECKED IN BY........

Amt. Sent	Amt. Ret'd	Amt. Used		COST	INVOICED AT

Credit and Debit Slips on All Classes of Work

While the system is obviously simple it seems to be effective and the firm is enabled to keep close account of the material used on all work handled. The fact that the final cost and invoice prices are kept so closely in sight also assures the office staff that the prices given on estimates or charged up in the regular way to customers entrusting their work to the firm on a ''labor and material basis'' are profitable.

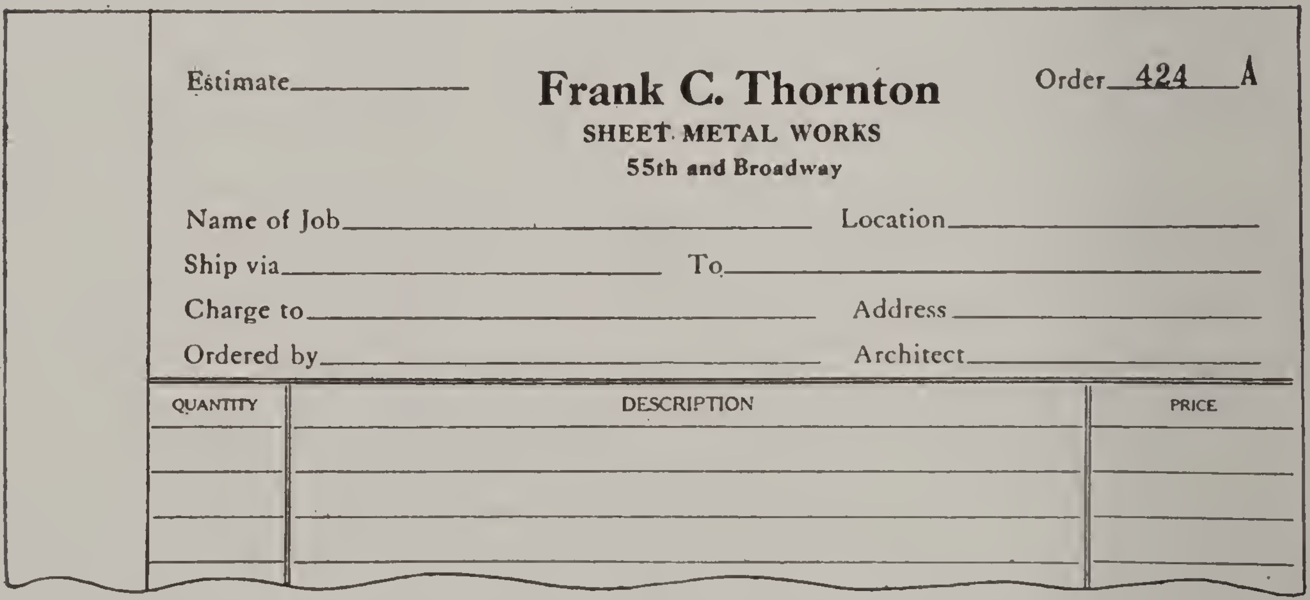
The material slip is also effective in keeping account of material left on jobs as it is necessary that the person responsible for its return should affix his initials to the original slip turned in by him when the material was taken out before credit can be given for the return of the goods. Thus if any carelessness on the part of workmen is displayed it is easy to put the blame on the shoulders of those responsible and to rectify the matter at once.

SIMPLIFIED COST ACCOUNTING IN A SHEET METAL SHOP

An Efficient Cost Keeping System in Operation
in the Sheet Metal Shop of Frank C. Thornton,
Cleveland, Ohio

When an order is taken it is entered on an order sheet as shown in an accompanying illustration and given an order number. This order is made out in triplicate on white, blue and yellow paper. One copy is kept in the office, one goes to the foreman and the third to the shipping clerk, who is also stock keeper.

When a workman takes material from the stock room he gives the stockkeeper a slip, a facsimile of which is shown in an accompanying illustration, which shows the amount of material and order on which it is to be used. The stockkeeper turns these slips in to the office every day and from them the stock room material is charged on the cost slip. The foreman keeps the order sheet until the job is completed, then he weighs the job and makes an entry on the order sheet showing the amount of sheet metal used, making sufficient addition to the weight to cover the waste.



Estimate____________

Frank C. Thornton
SHEET METAL WORKS
55th and Broadway

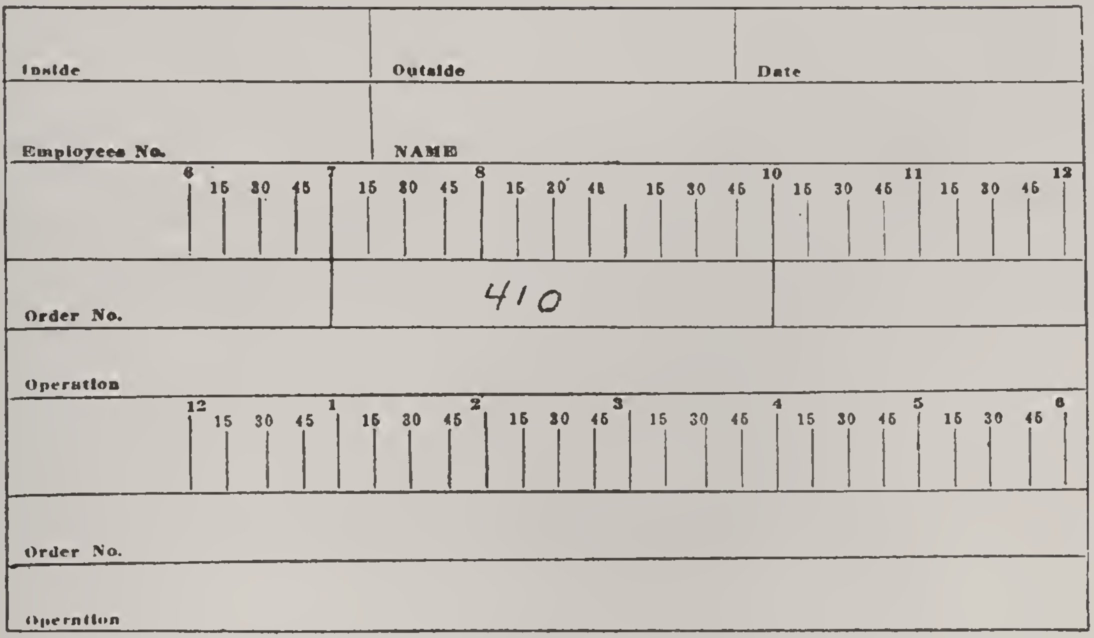
Order 424 A

Name of Job____________ Location____________
Ship via____________ To____________
Charge to____________ Address____________
Ordered by____________ Architect____________

QUANTITY	DESCRIPTION	PRICE

Order Sheet, 7½ x 9½ In.

It may be noted that the foreman's only duties are to keep the men at work and to take care of the raw material. Each workman enters his time on a daily time slip like that shown in the accompanying illustration which shows on what work he spent his time during the day. For example, the lines in pencil extended down from the printed lines opposite the figures 7 and 10 and the space filled in with the number 410 indicate that the man's time from 7 to 10 o'clock was spent on order 410.



Inside | Outside | Date

Employees No. | NAME

Order No. 410

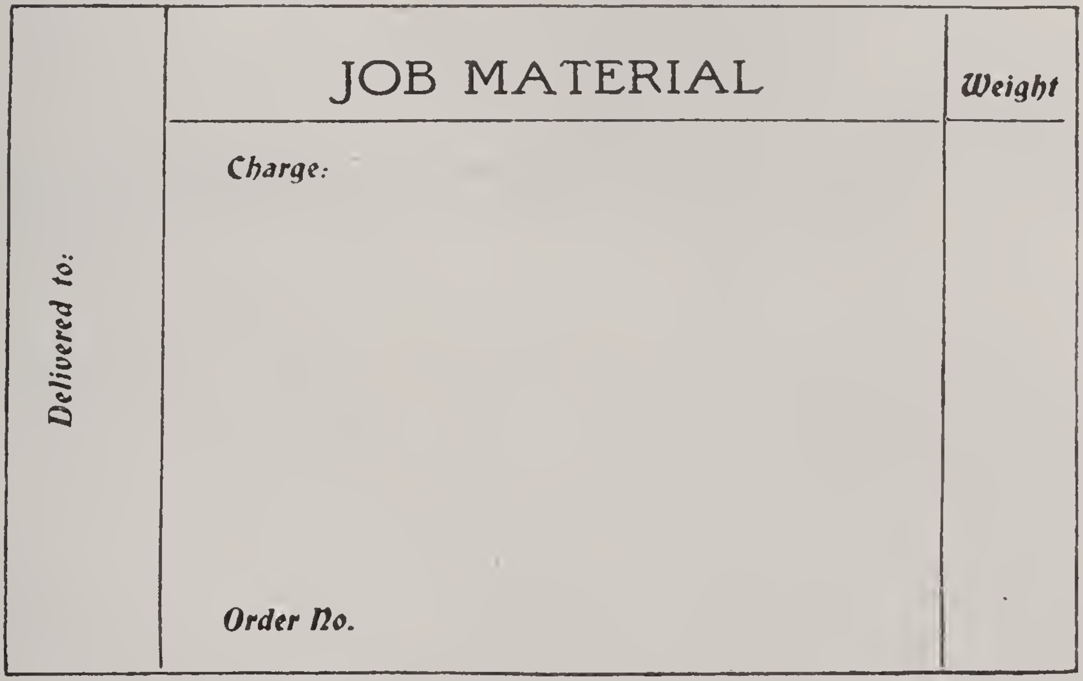
Operation

Order No.

Operation

6 15 30 45 7 15 30 45 8 15 30 45 15 30 45 10 15 30 45 11 15 30 45 12
12 15 30 45 1 15 30 45 2 15 30 45 3 15 30 45 4 15 30 45 5 15 30 45 6

Workman's Daily Time Slip, 3½ x 6 In.



JOB MATERIAL

Weight

Charge:

Delivered to:

Order No.

Stock Accounting Sheet, 3¾ x 6 In.

COST SHEET

Name of Job Month Shop Order No.

DATE	[illegible]	MATERIAL	FROM STOCK	PURCHASED DIRECT	[illegible]	RECAPITULATION	
						Cost of Material—Stock	
						Cost of Material—Direct	
						Cost of Labor	
						Freight and Express	
						Drayage	
						R R Fare	
						Board	
						Traveling Expenses	
						Incidentals	
						Running Expense	
						Total	
						Estimated Selling Price	
						Profit	
						Loss	

Cost Sheet, 10 x 14½ In.

C. Thornton TIME

Name of Job Month Shop Order No. Total

Workmen	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Hours	Rat	Amount
1																																		
2																																		
3																																		
4																																		
5																																		
6																																		
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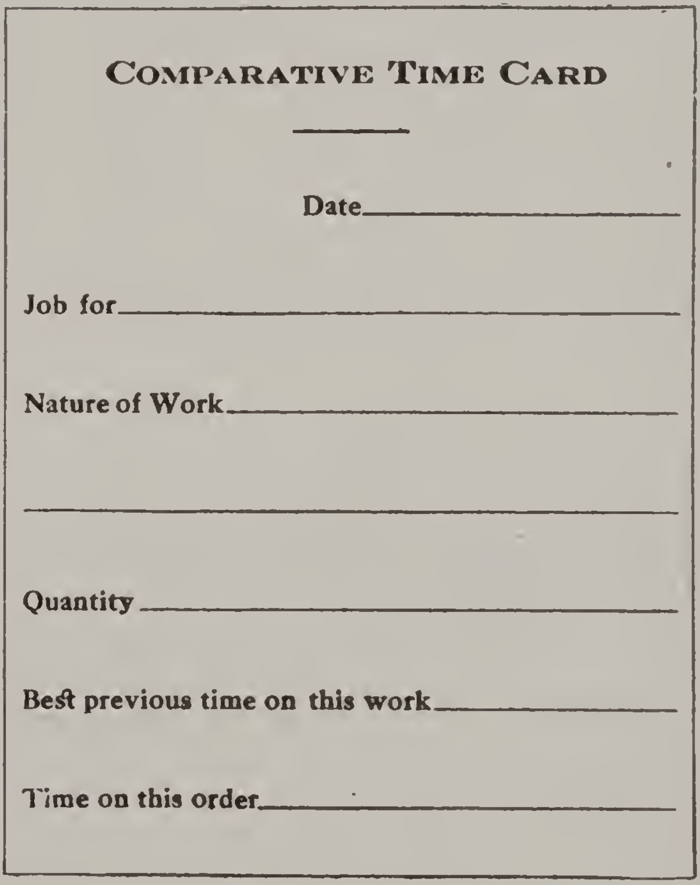
Reverse of Cost Sheet, Showing Total Labor on Job

The costs are entered in the office from the order sheet, material slip and time slip upon the cost sheet, which is also reproduced in an accompanying illustration. On one side of this sheet are blanks to be filled showing the names or number of the men working on the job, the number of hours they spent on the job during the month and what days. When this data is totaled it shows the total labor cost, which is tabulated on the opposite side of the cost sheet together with the material cost and other expenses, including overhead. By a glance at the recapitulation on this sheet the total cost of a job can be seen.

COST SYSTEM FOR SHEET METAL CONTRACTORS

Features of Cost Accounting System Used by a Middle Western Firm—Special Attention to Keeping Account of Labor

THE series of data sheets used with success and evolved by members of the Mohr-Jones Hardware Co., Racine, Wis., are interesting examples of how sheet metal working costs may be kept accurately without intricate methods of procedure. The company operates an extensive sheet metal shop independent of its hardware store and has conducted it most successfully, financially and otherwise, for many years.



COMPARATIVE TIME CARD

Date ____________

Job for ____________

Nature of Work ____________

____

Quantity ____________

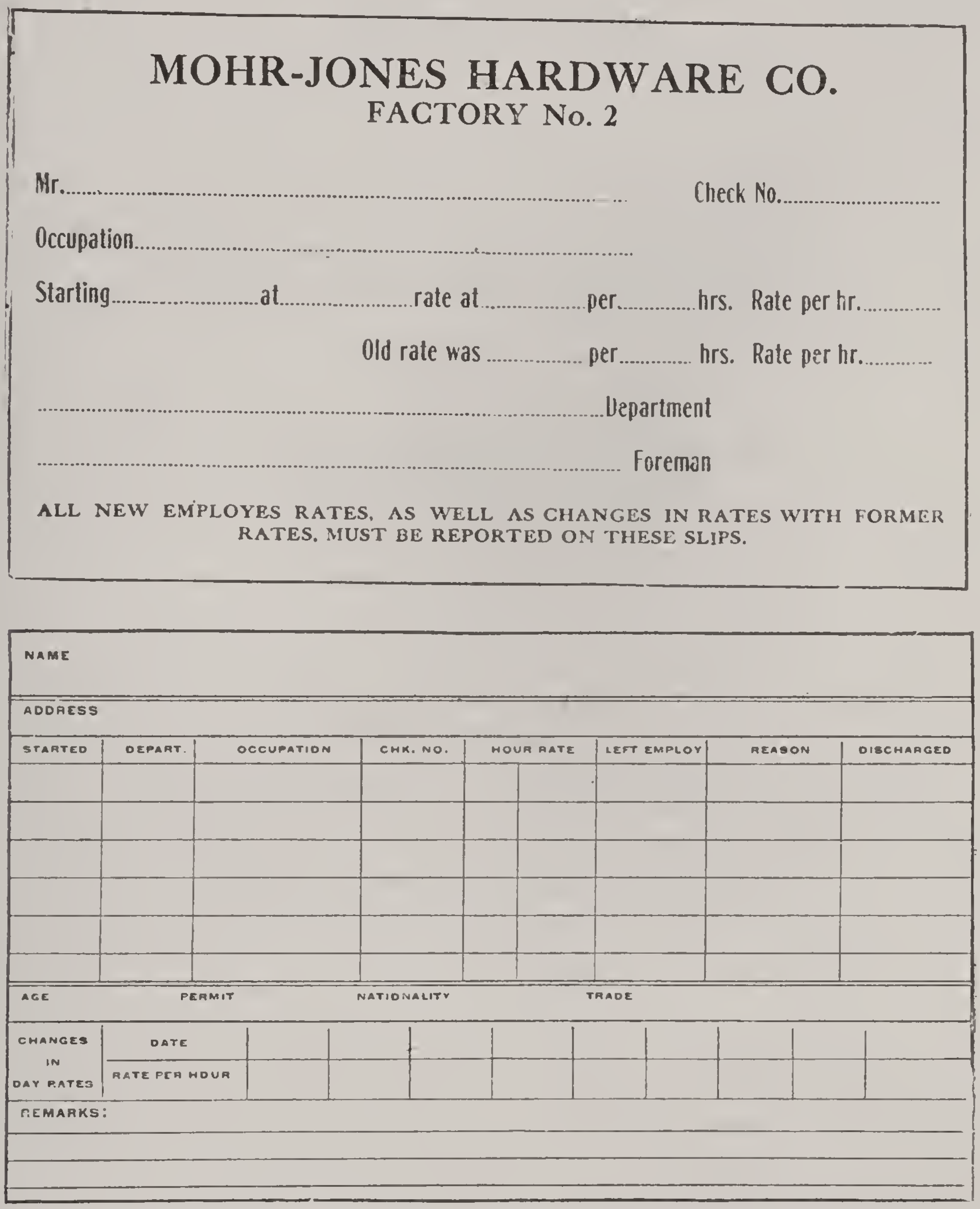
Best previous time on this work ____________

Time on this order ____________

Time Card for Stimulating Effort

For the correct cost keeping of each job, six cost sheets are brought into operation, shop order, stock room requisition, return stock, job card, comparative time card and final cost card.

The receipt of an order necessitates the making out of a shop order in duplicate, one for the shop clerk and the other for the foreman in the shop. It might be stated there that the company manufactures practically all its own products in sheet metal work, which means that co-operation between the foreman in the shops and those handling the costs is absolutely essential to maintain the cost system. A clerk is employed solely to keep the costs of all contracts and jobbing work and also the stock records.



MOHR-JONES HARDWARE CO.
FACTORY No. 2

Mr.……………………………… Check No.………………
Occupation………………………………
Starting…………at…………rate at…………per…………hrs. Rate per hr.…………
Old rate was…………per…………hrs. Rate per hr.…………
………………………………Department
………………………………Foreman

ALL NEW EMPLOYES RATES, AS WELL AS CHANGES IN RATES WITH FORMER RATES, MUST BE REPORTED ON THESE SLIPS.

NAME
ADDRESS

STARTED	DEPART.	OCCUPATION	CHK. NO.	HOUR RATE		LEFT EMPLOY	REASON	DISCHARGED

AGE PERMIT NATIONALITY TRADE

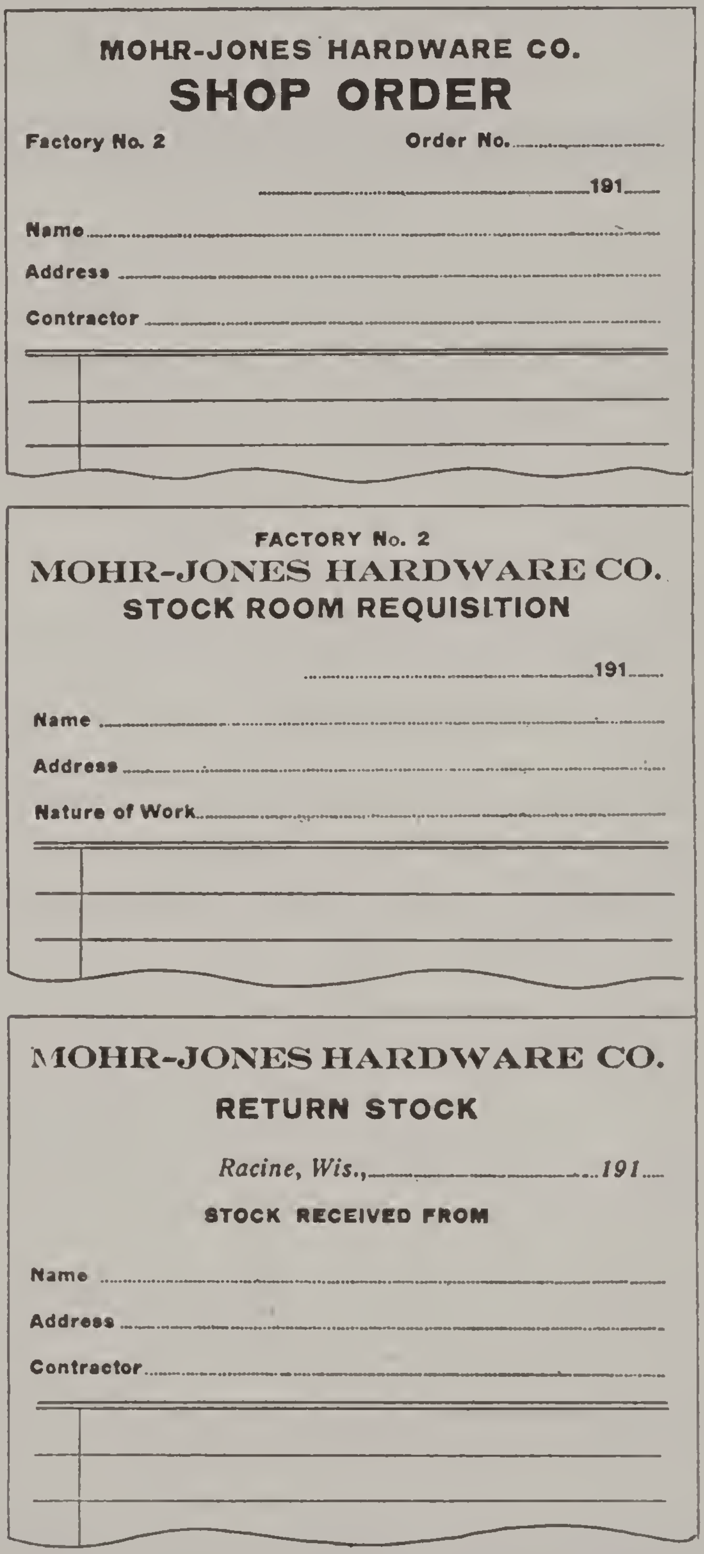
CHANGES IN DAY RATES	DATE									
	RATE PER HOUR									

REMARKS:

Front and Reverse of Employee's Record Card

At the same time a shop order is made out a final cost sheet for summarizing the total costs of labor, materials, profit and overhead expense is also made out and kept on file until the work is completed.

When material is needed from the stock room, the foreman makes out a stock requisition singly, and when



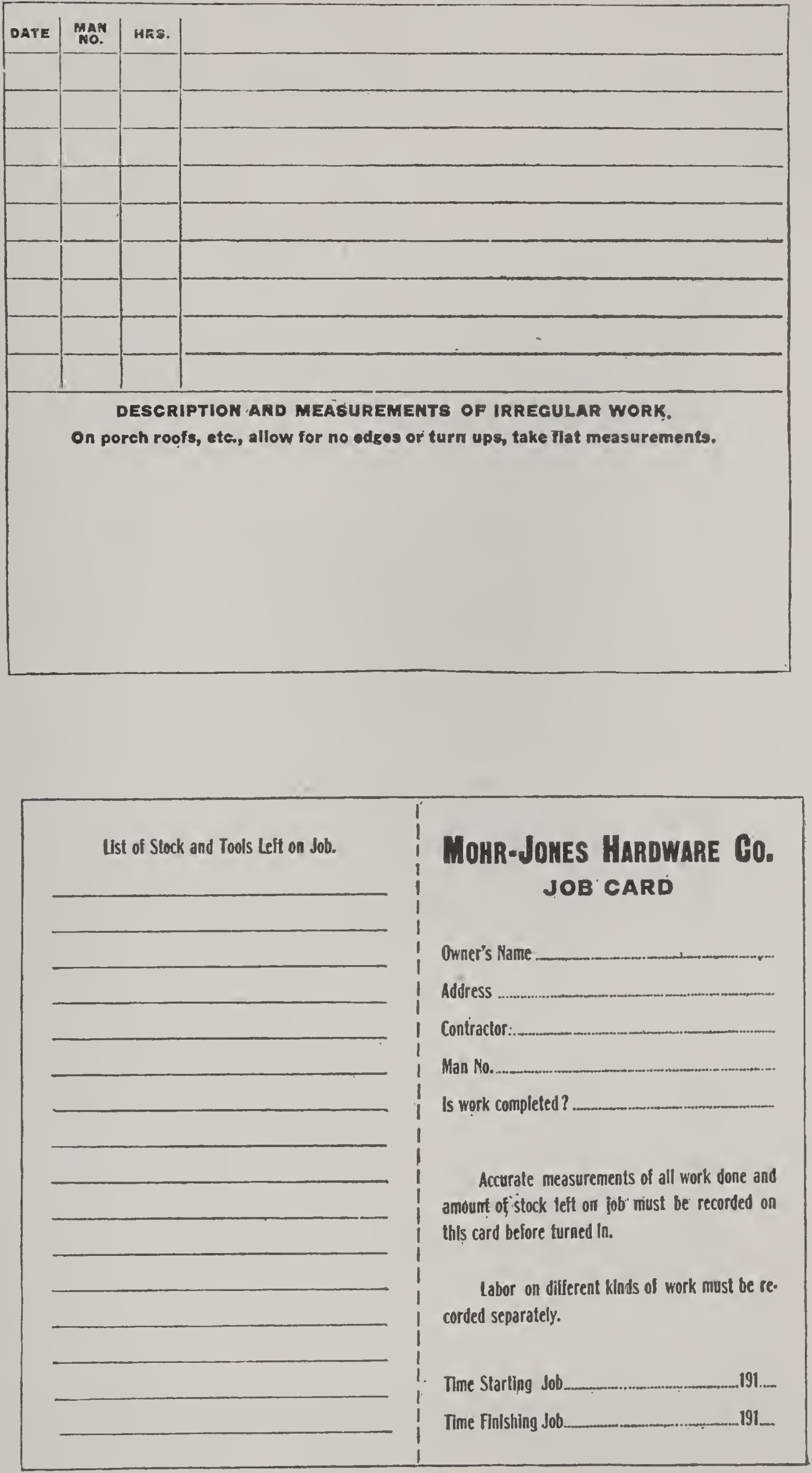
MOHR-JONES HARDWARE CO.
SHOP ORDER
Factory No. 2 Order No. ....
.................................191......
Name ....
Address ....
Contractor ....

FACTORY No. 2
MOHR-JONES HARDWARE CO.
STOCK ROOM REQUISITION
.................................191......
Name ....
Address ....
Nature of Work ....

MOHR-JONES HARDWARE CO.
RETURN STOCK
Racine, Wis., ...*191*......
STOCK RECEIVED FROM
Name ....
Address ....
Contractor ....

Sheets Used to Keep Account of Material on Each Order

the order is completed the slip is sent to the office, where the amount of stock taken is marked off the stock card and also entered against the particular job for which it is required. The return material slip is handled in the same



DATE	MAN NO.	HRS.	

DESCRIPTION AND MEASUREMENTS OF IRREGULAR WORK.

On porch roofs, etc., allow for no edges or turn ups, take flat measurements.

List of Stock and Tools Left on Job.

MOHR-JONES HARDWARE CO.

JOB CARD

Owner's Name

Address

Contractor:

Man No.

Is work completed?

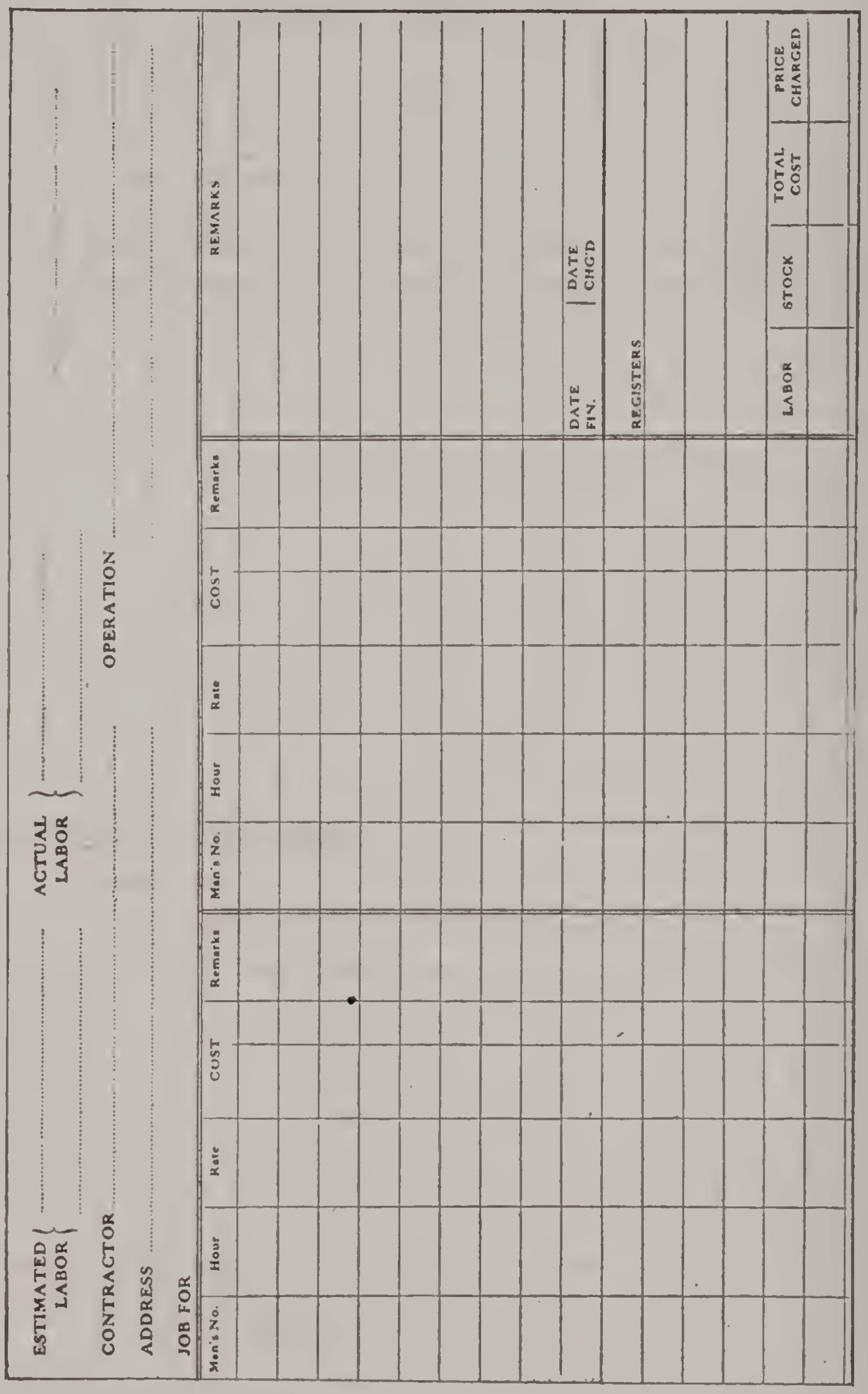
Accurate measurements of all work done and amount of stock left on job must be recorded on this card before turned in.

Labor on different kinds of work must be recorded separately.

Time Starting Job 191

Time Finishing Job 191

Face and Reverse of Card Showing Time on Jobs for One Day



ESTIMATED LABOR { ....

ACTUAL LABOR { ....

CONTRACTOR .... OPERATION ....

ADDRESS ....

JOB FOR ....

Men's No.	Hour	Rate	COST	Remarks	Men's No.	Hour	Rate	COST	Remarks	REMARKS

DATE FIN. | DATE CHG'D

REGISTERS

LABOR	STOCK	TOTAL COST	PRICE CHARGED

Face of Final Cost Sheet

STOCK	RATE	COST	STOCK	RATE	COST

Reverse of Final Cost Sheet

way and credits are made accordingly on the cost and stock cards.

To handle this last phase of the work correctly, cooperation between the workmen and the cost clerk is essential. On the back of the men's time card is found a space wherein may be entered a list of the stock and tools left on the job. When the time card is turned in the cost clerk notes what notations have been made, and he, in turn, instructs the motor truck driver to call at the job to pick up the materials left, providing the job is completed.

All men employed by the company receive a number on entering the company's service. For each day's work a separate time card is used, which is turned over to the foreman at night for checking. The cost clerk then receives the time cards, so that the costs may be charged to the various jobs that have been worked on. By this method the cost clerk is also able to keep track of how any particular or all jobs are advancing.

Each time card contains specific instructions that accurate measurements of all work executed that day and the amount of stock left on the job be recorded on the card before being turned in at night. Labor on different kinds of work must also be recorded separately so that the costs per hour may be charged on the class of work executed.

The men are also put on their mettle by the use of a comparative time card. This has been used with some success on inside work and has worked out fairly well on outside work. When the workman sees the best previous time on such another job as he is about to do, for his own protection and betterment he will do his best to at least equal that time if not better it.

With the completion of any contract or jobbing work, the summary of costs on the final slip reveals the actual cost of the work on both the labor and material ends. With the addition of profit and overhead charges the selling price is determined. All slips used are filed alphabetically in special cabinets for future reference.

The company also pays particular attention to the men themselves regarding former employers and the work they have been used to handling. When a man is employed by the company his name, occupation and rate per hour for his work is entered on a special card. Another card deals with his former work, its nature, hourly rate, reason for leaving it, etc. The veracity of the man's statement can be found out by communication with his former employers if necessary, but usually the class of men applying for work have been found good employees. By keeping such a complete record the company has found its labor problems minimized.

SHEET METAL AND FURNACE SHOP COST KEEPING

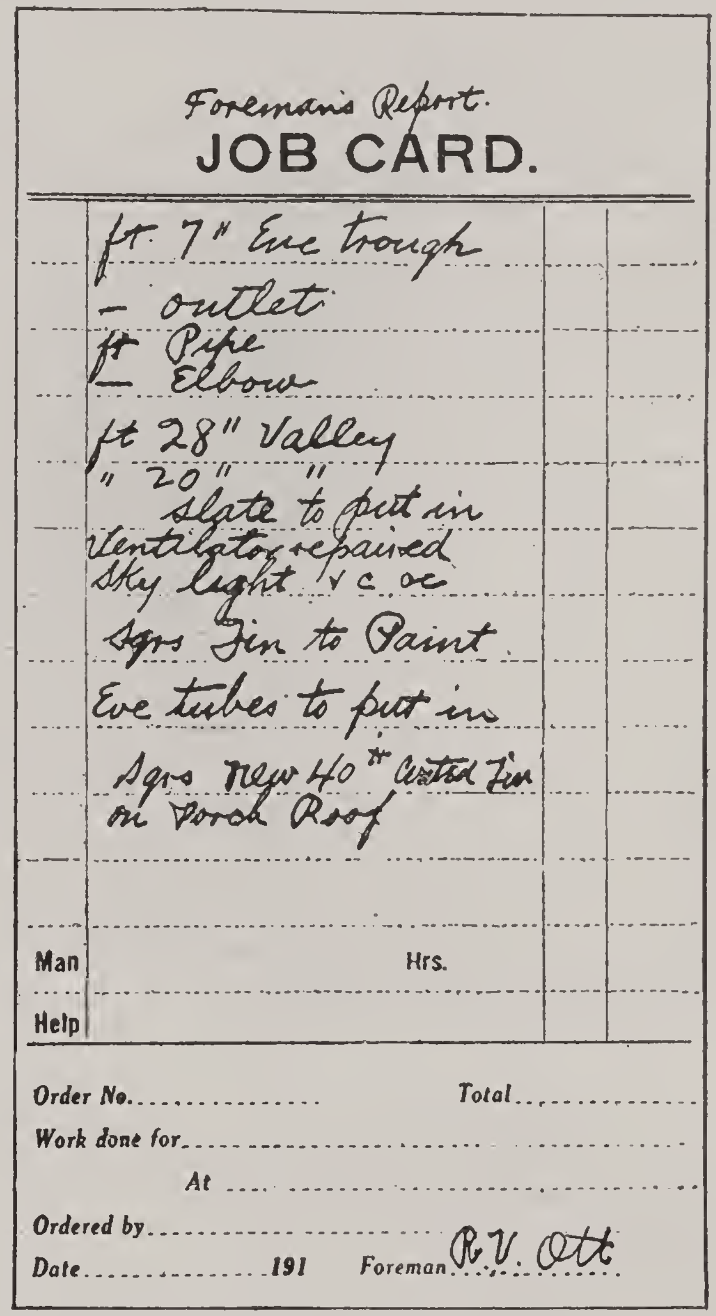
Methods of Accounting Employed In A Characteristic Establishment Devoted To the Cornice, Roofing, Furnace and Stove Business

The business places of men who have made the National Association of Sheet Contractors a power in the trade are centers of interest to all interested in the movement whether as members or as sympathizers. Since the convention of the association in Washington, D. C., a new interest has been manifested in the establishment in Nashville, Tenn., where James A. Daugherty, the man who was elected president, has built up a successful business by shrewd and far-sighted management and by an expenditure of energy which, at the same time, has not changed the smile of good fellowship on his face.

The brief history of McKay Brothers & Daugherty, of which firm he is a member, shows that his genial personality was the "something" needed besides knowledge and business ability. The keen insight into human nature and the sound business judgment backed by his happy greeting go a long way in securing the confidence of the customer that leads to trading which is mutually satisfactory.

When an order is received by mail, over the phone or through a visit of the customer a card is made out, the two sides of which are shown herewith. The card is perforated and is 4 x 7 ins. in size. On it is written the customer's name and address and the character of work required. This is turned over to the outside foreman, who visits the job and makes a personal examination of the needs. On the reversed side he makes an itemized record of what is needed and returns the card to the office. He is then instructed to select the workman best qualified to do the work and take him with the necessary materials and tools to the place where the work is to be done and give him detailed instructions as to doing it.

When the work is completed the workman returns the card to the office with the time consumed marked upon it and the quantity of material used. The foreman is given this card and again visits the job to see that the work has been done correctly and he then returns the card to the office stating that all is right and the charge should be made. This double inspection makes both the men and the foremen take an interest and feel a responsibility with the result that the firm has little trouble with this most exacting class of business. For larger jobs a yellow sheet 8¼ x 11 ins. in size, bearing the items as shown, is given the workman. On the completion of the work he makes an entry showing what materials and tools are left at the job, and this is checked up by the stock clerk, who charges each job with everything that is sent to it, and credits it with everything that is returned. This gives a double check on the job and shop cards, and thus he keeps track of ladders, tools, paint cans, etc.



Foreman's Report.

JOB CARD.

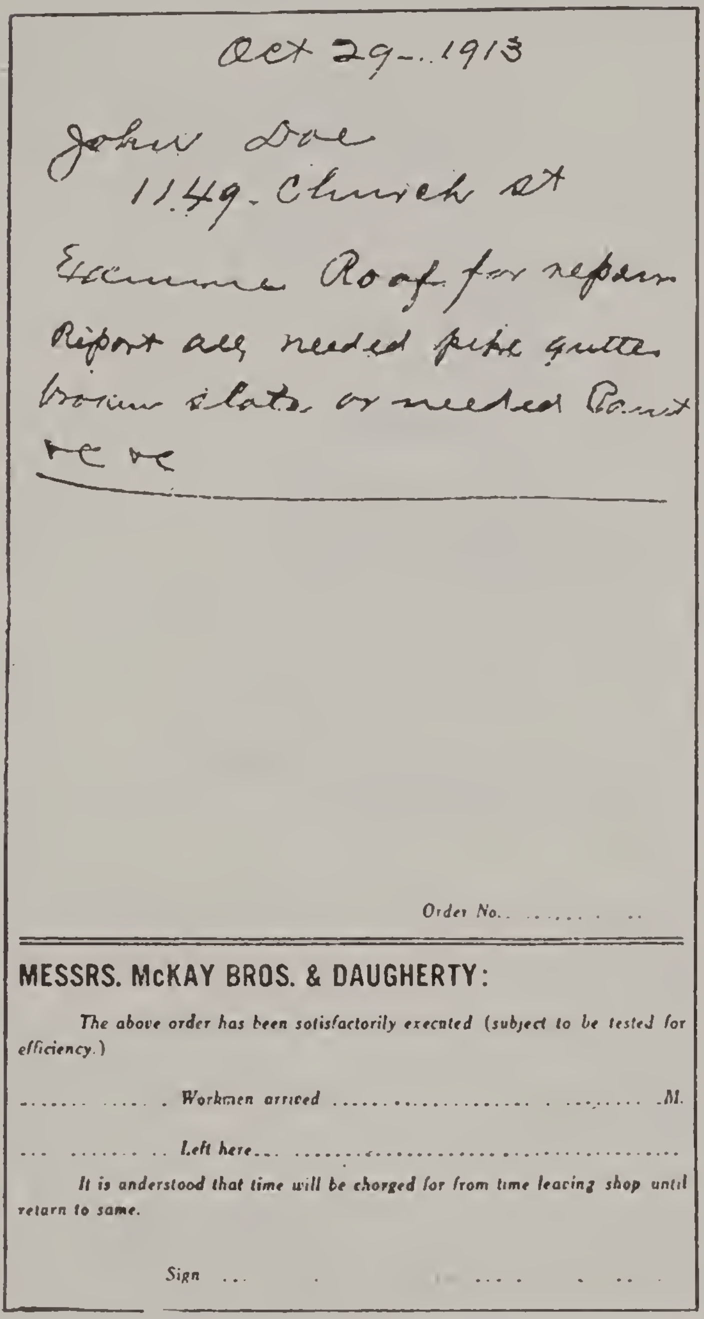
ft 7" Eve trough
— outlet
ft Pipe
— Elbow
ft 28" Valley
" 20" "
slate to put in
Ventilator repaired
Sky light &c &c
Sqrs Tin to Paint
Eve tubes to put in
Sqrs New 40# Coated Tin on Porch Roof

Man Hrs.
Help

Order No. Total
Work done for
At
Ordered by
Date 191 Foreman R. V. Ott

Foreman's Report Card for Repair Work

An accurate record is kept of all work requiring a second coat of paint, so that it is given at the right time. Reference can be made to the date when every job is done, what workmen did it, and whether the foreman put his O. K. upon it so that everything can be proved and a positive knowledge obtained that everything was executed and charged properly. The system has proved simple, complete and satisfactory. In busy times the system shows where all ladders, tools, equipment and materials are to be found, and if anything is neglected steps can be taken to make correction promptly. It is from an establishment run on such a commendable basis that the National Association of Sheet Metal Workers unanimously chose James A. Daugherty its president. He is already busy on plans which when carried into execution will mark his administration as most useful when he reports at Cincinnati, Ohio, and presides over the deliberation of the association in June, 1914. With the character of business, with which Mr. Daugherty is identified, he has ample opportunity to experience all of the troubles that visit any members of the association, and it is from such a business that he brings ripened judgment to aid in the solution of the problems that are laid before the president of a National organization.



Oct 29 - 1913

John Doe
1149 - Church st

Examine Roof for repair
Report all needed pipe gutter
broken slate or needed Paint
&c &c

Order No. ....

MESSRS. McKAY BROS. & DAUGHERTY:

The above order has been satisfactorily executed (subject to be tested for efficiency.)

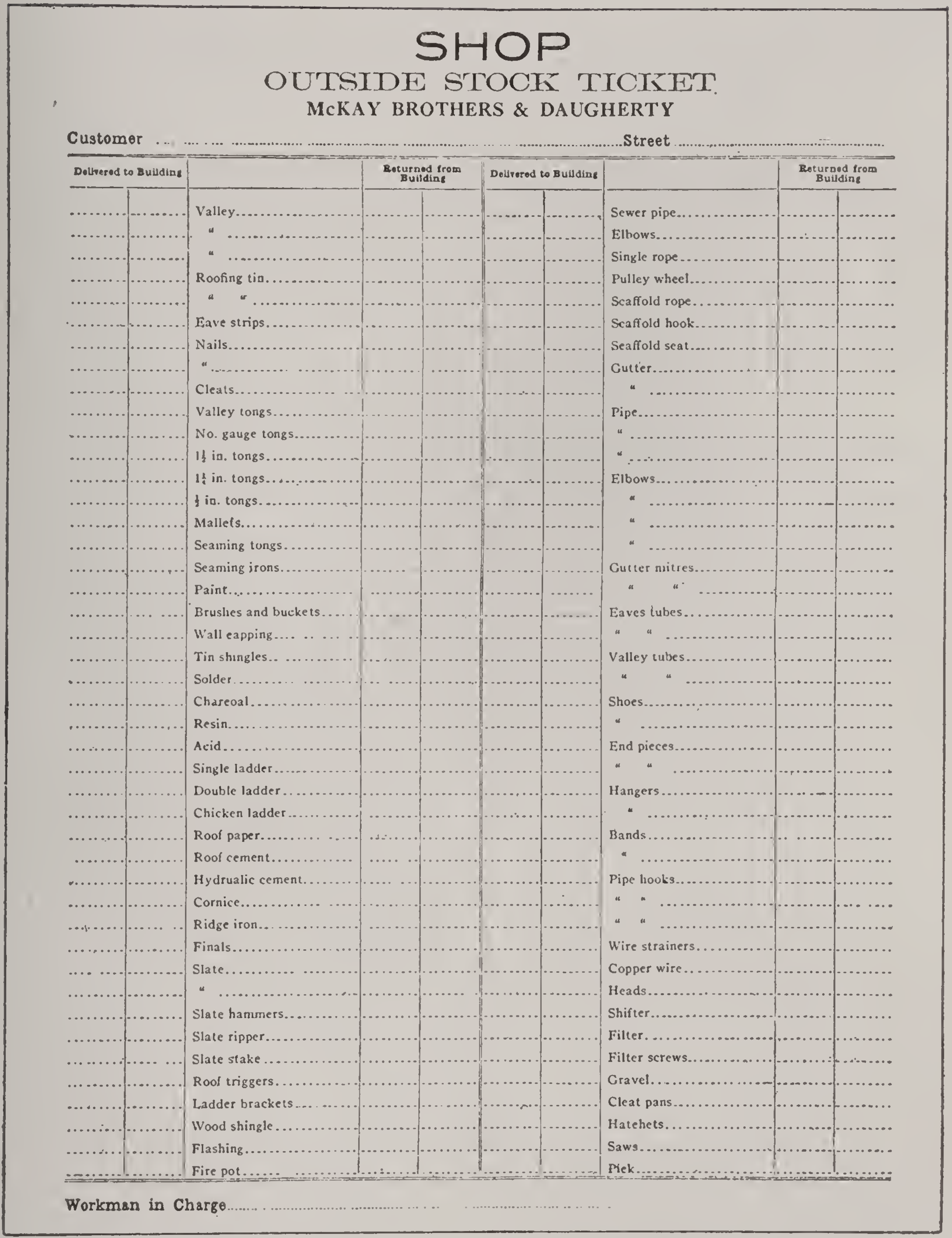
.... *Workmen arrived* .... *M.*

.... *Left here* ....

It is understood that time will be charged for from time leaving shop until return to same.

Sign ....

Workman's Report Card on Repair Work



SHOP

OUTSIDE STOCK TICKET

McKAY BROTHERS & DAUGHERTY

Customer .... **Street** ....

Delivered to Building			Returned from Building		Delivered to Building			Returned from Building	
		Valley					Sewer pipe		
		"					Elbows		
		"					Single rope		
		Roofing tin					Pulley wheel		
		" "					Scaffold rope		
		Eave strips					Scaffold hook		
		Nails					Scaffold seat		
		"					Gutter		
		Cleats					"		
		Valley tongs					Pipe		
		No. gauge tongs					"		
		1½ in. tongs					"		
		1¼ in. tongs					Elbows		
		½ in. tongs					"		
		Mallets					"		
		Seaming tongs					"		
		Seaming irons					Gutter mitres		
		Paint					" "		
		Brushes and buckets					Eaves tubes		
		Wall capping					" "		
		Tin shingles					Valley tubes		
		Solder					" "		
		Charcoal					Shoes		
		Resin					"		
		Acid					End pieces		
		Single ladder					" "		
		Double ladder					Hangers		
		Chicken ladder					"		
		Roof paper					Bands		
		Roof cement					"		
		Hydrualic cement					Pipe hooks		
		Cornice					" "		
		Ridge iron					" "		
		Finals					Wire strainers		
		Slate					Copper wire		
		"					Heads		
		Slate hammers					Shifter		
		Slate ripper					Filter		
		Slate stake					Filter screws		
		Roof triggers					Gravel		
		Ladder brackets					Cleat pans		
		Wood shingle					Hatchets		
		Flashing					Saws		
		Fire pot					Pick		

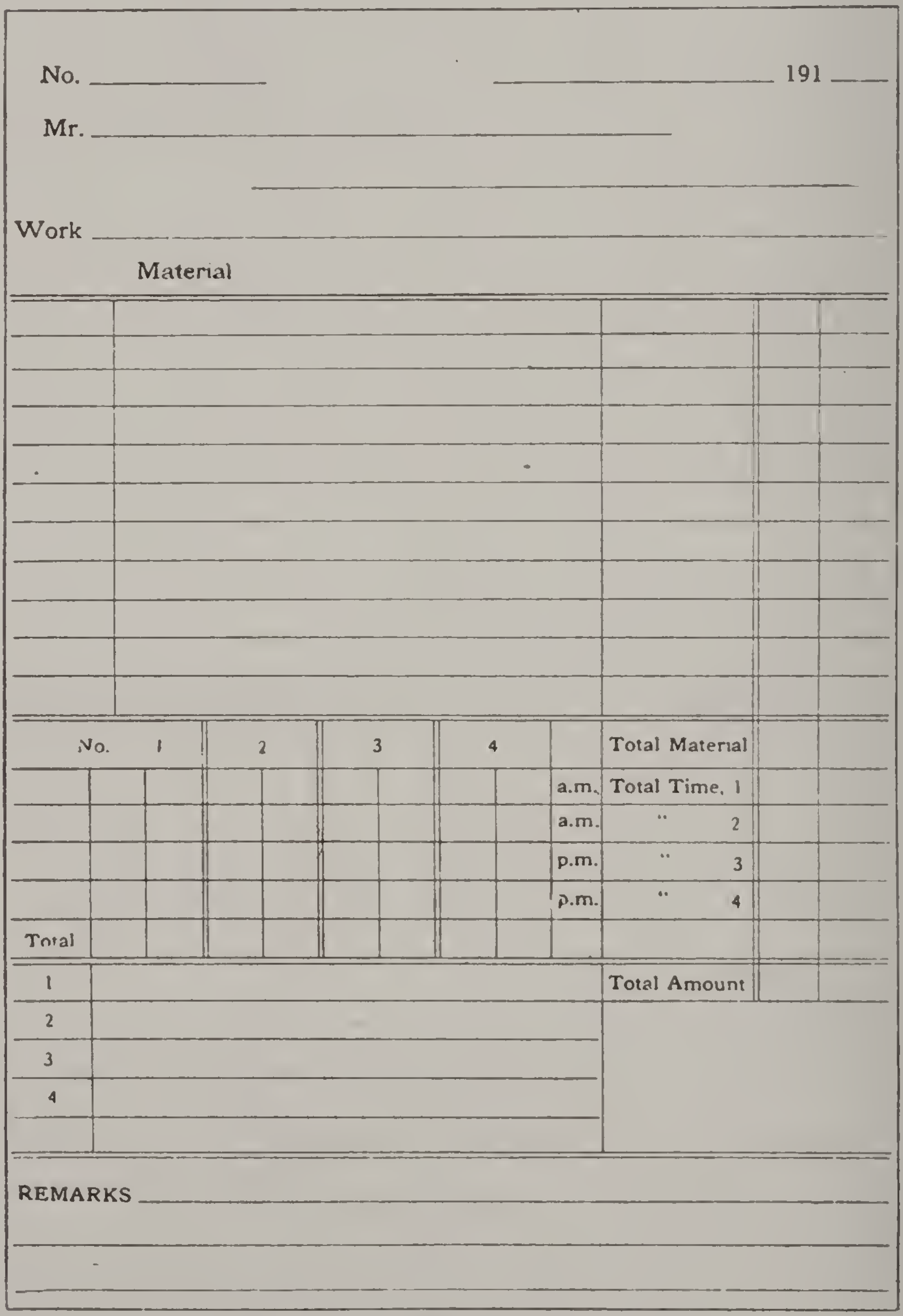
Workman in Charge ....

Change Sheet Designed to Eliminate Oversight of Material Used or Returned

COST SHEET FOR WORK DONE OUTSIDE OF SHOP

A Form Used by W. M. Organ, Jr., Liberty, Tenn., for Keeping Account of the Cost of Sheet Metal Jobs Performed by Him Outside of His Shop is Commented Upon by its Author as Follows:

A FORM that I find of assistance in keeping up with jobs outside of the shop accompanies this explanation. A great many tinners like myself have a lot of territory that they work in and unless we use something of this



No. ______ ______ 191__

Mr. ______

______

Work ______

Material

No.	1		2		3		4			Total Material		
									a.m.	Total Time, 1		
									a.m.	" 2		
									p.m.	" 3		
									p.m.	" 4		
Total												

1		Total Amount		
2				
3				
4				

REMARKS ______

______

______

Cost Sheet for Outside Work

kind we know nothing about what to charge for our work unless we go to the workman and ask a lot of questions. I scarcely ever have occasion to have over four men on one job and when the men leave the shop they take one of these slips. One man acts as foreman and he puts down the time as it is worked. He puts down the time work is begun in the morning and time stopped at noon, and so on.

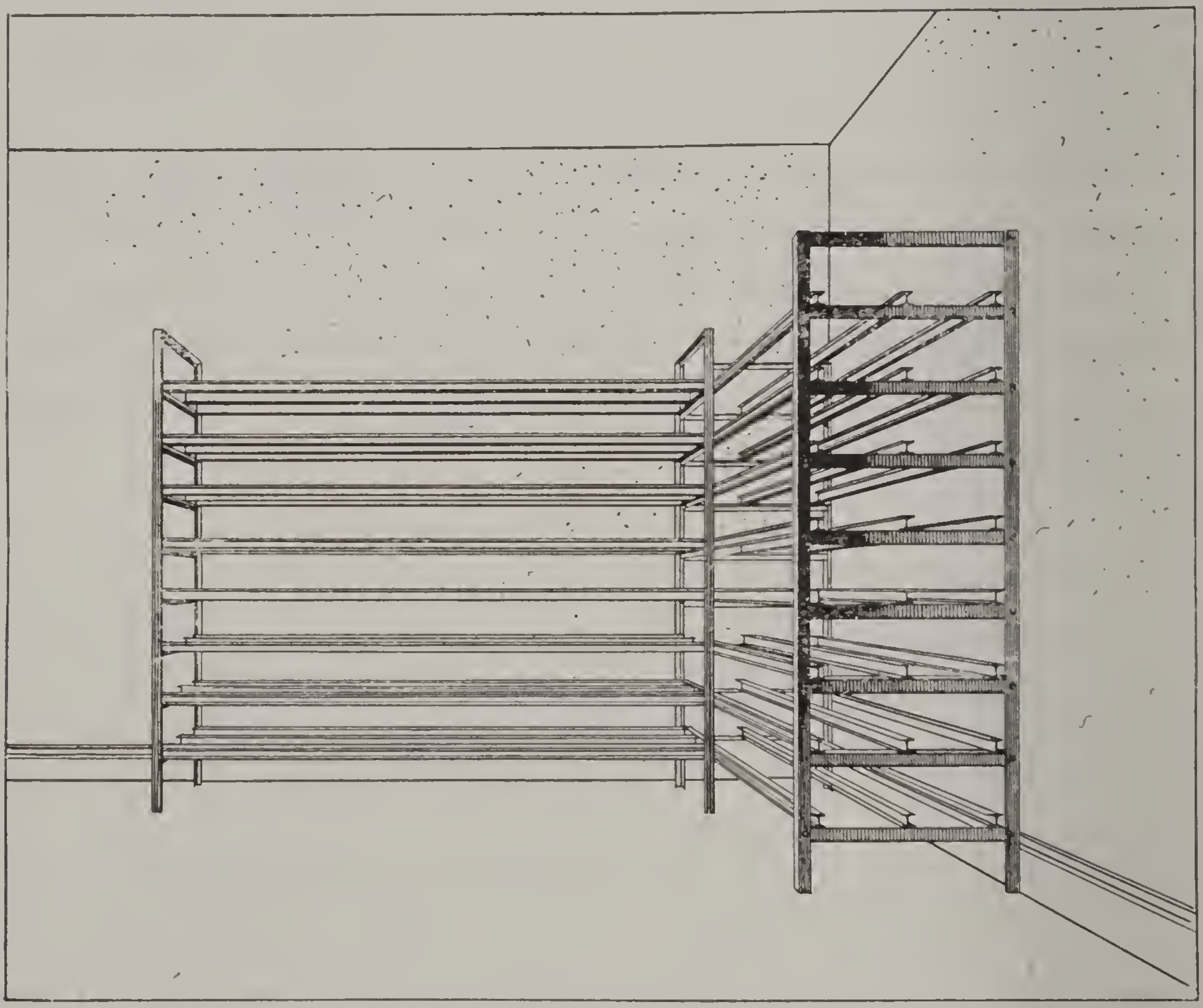
As we pay the men by the time shown on these slips we have them sign on the line corresponding with that in which their time is listed.

The extensions are made in the office. We know then what to charge for the job, or if we made a price before the work is done we know what the profit is. The blank under "Total Amount" is used for posting.

If the job lasts more than one day the first day's slip will be No. 1 and next day's No. 2, and so on. In totaling the men's time we use only the amount that we intend to charge for same and not what we pay them; that is kept on the time book in the office. Then if we want to show a customer the slip for his work we can do so.

AN EASY STOCK-KEEPING SHEET RACK

A glance at the storage rack used by Kirk & Blum, Cincinati, O., is sufficient to show exactly how many sheets of a particular gauge, or of a special kind are in stock. This, which obviously is one of the chief advantages of a rack of this kind, is possible through the method of storing the sheets employed. Heavy sheets at the bottom, lighter as the compartments of the rack rise one above the other, is the order maintained. The accompanying illustration shows that the gauge number is marked on the channel iron at one end. The lowest compartment



An Easy Stock-keeping Sheet Rack

contains sheets of 14 gauge and the rest 16 gauge, then so on down to 28 gauge on the upper tier.

Such a rack might be built of any desired capacity. Set as shown, with one rack endwise to the wall and the next lengthwise alternately, the sheets may be conveniently removed and the number of each in stock seen at a glance. Blue sheets, black sheets, galvanized sheets, all kinds and qualities, may be kept separate and in good condition. In the Kirk & Blum shop it is the practice to mark each sheet with a number as it is stored away, thus, for instance, if the top sheet in the compartment holding 24 gauge black sheets is numbered 69, that would indicate that 69 sheets of that particular weight are in stock. As additions are made the numbers on the new sheets begin with the highest shown on the sheets already in the rack, so that there are never any lost sight of. The top sheet in any compartment thus shows at any time how many sheets of that particular gauge are in the rack and the superintendent can thus easily watch his stock and keep it up to requirements.

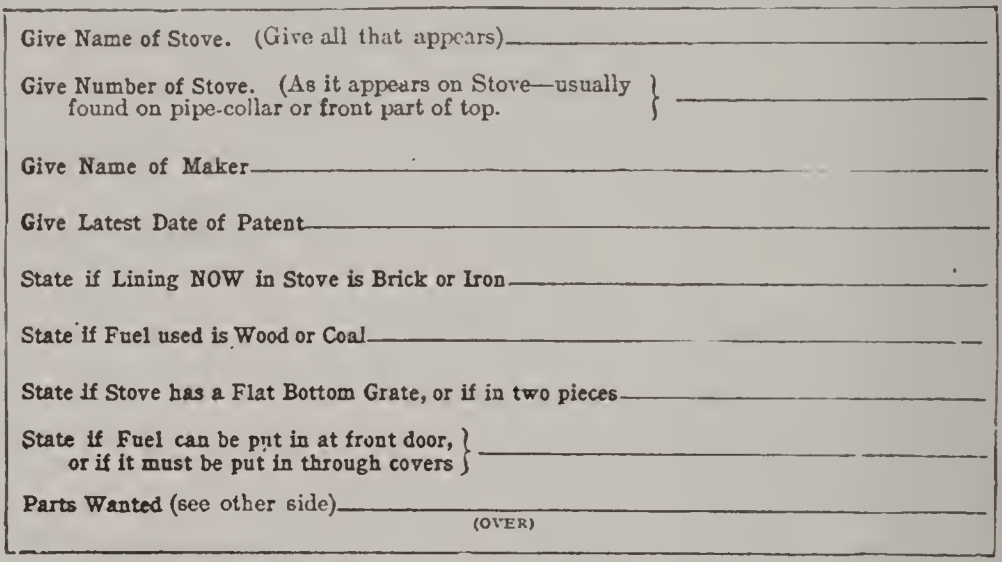
Once a week the superintendent turns over to the buyer a report which shows the top number of the sheets in each rack. Thus the buyer is afforded a ready means of ascertaining what should be purchased to maintain the stock at the required amount.

The rack is constructed of angles and I-beams. The uprights are of 3 x 3 x ¼-in. angles, while the laterals are 3-in. I-beams securely bolted to the angles. The racks are constructed to accommodate sheets 36 in. x 120 in.

SYSTEMS IN STOVE REPAIR BUSINESS

Methods Followed by Prominent Repair Houses to Minimize Delay, with Consequent Increase in Profits and Satisfaction to Customers

The experience of stove-repair houses has demonstrated that it is absolutely essential to have an efficient system for ordering and handling repairs if there is to be any profit in their business or if satisfactory service is to be given to customers.



Give Name of Stove. (Give all that appears)

Give Number of Stove. (As it appears on Stove—usually found on pipe-collar or front part of top.)

Give Name of Maker

Give Latest Date of Patent

State if Lining NOW in Stove is Brick or Iron

State if Fuel used is Wood or Coal

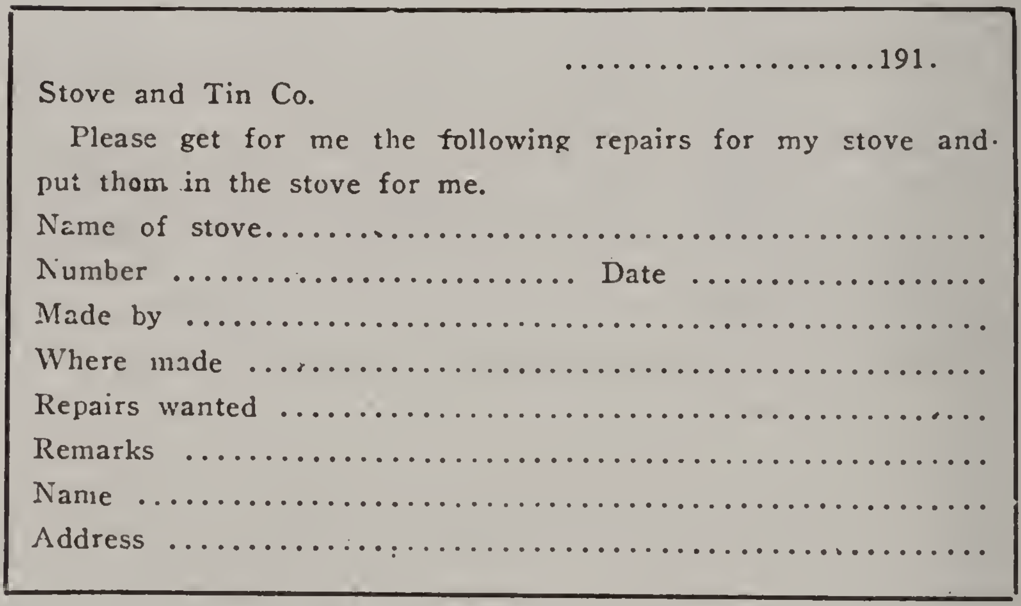
State if Stove has a Flat Bottom Grate, or if in two pieces

State if Fuel can be put in at front door, or if it must be put in through covers

Parts Wanted (see other side)

(OVER)

Information Blank to be Filled in by Customer



....................191.

Stove and Tin Co.

Please get for me the following repairs for my stove and put them in the stove for me.

Name of stove...

Number .... Date ....

Made by ....

Where made ....

Repairs wanted ....

Remarks ....

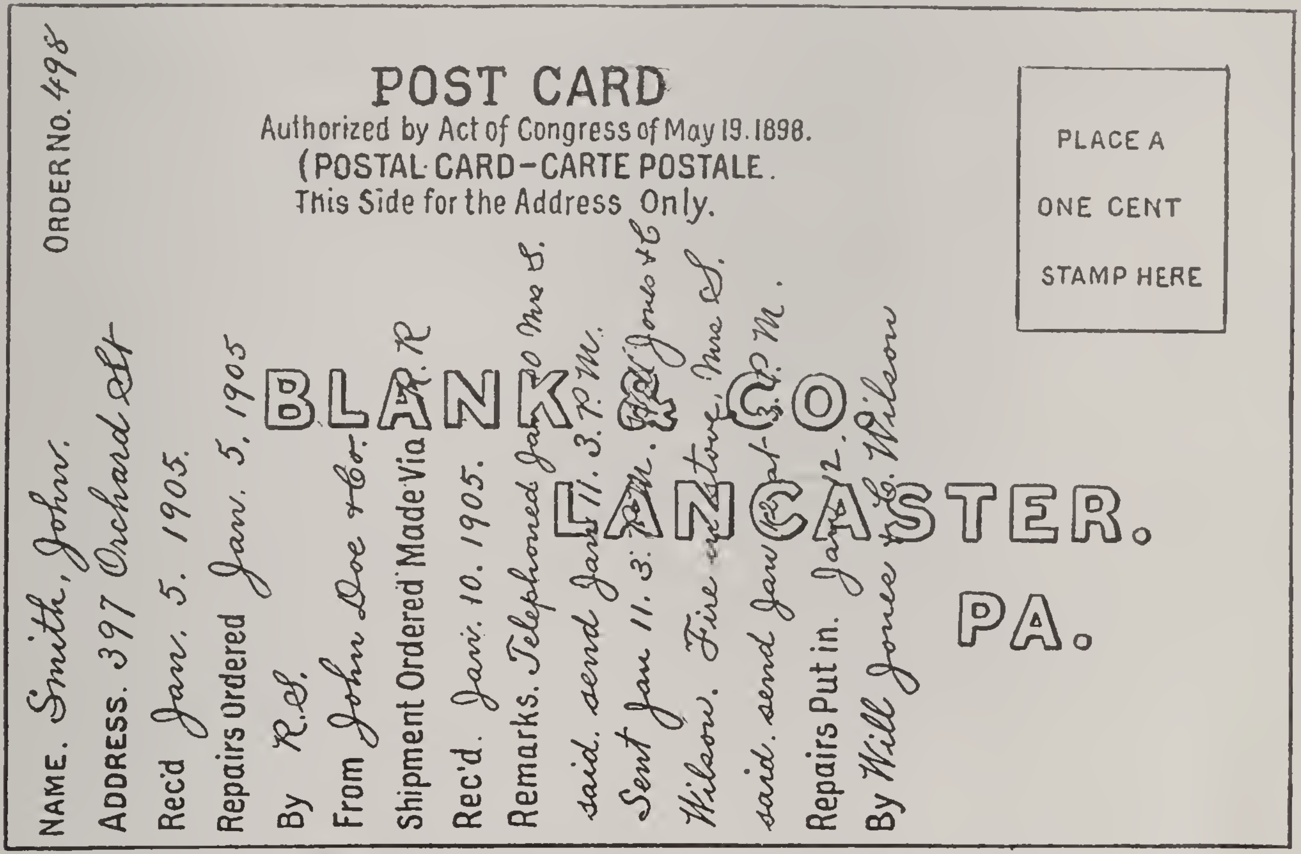
Name ....

Address ....

Reverse of Above Card

The parts required for different customers can be kept separate in the shipment from the foundry to avoid confusion and it is advisable that the dealer insist on a deposit by the customer when he orders repairs for his stove or furnace to prevent a loss.

It has been demonstrated time and again that the work of handling a retailer's stove repair business in the rush of the fall season successfully cannot be done by inexperienced, cheap help, but must have the attention of a man of some judgment and ability as well as reliability. It is also essential that there shall be provided for handling this rather exacting line of trade, printed blanks and a system which will in a great measure simplify the work and reduce the possibility of annoying errors.



POST CARD
Authorized by Act of Congress of May 19. 1898.
(POSTAL CARD—CARTE POSTALE.
This Side for the Address Only.

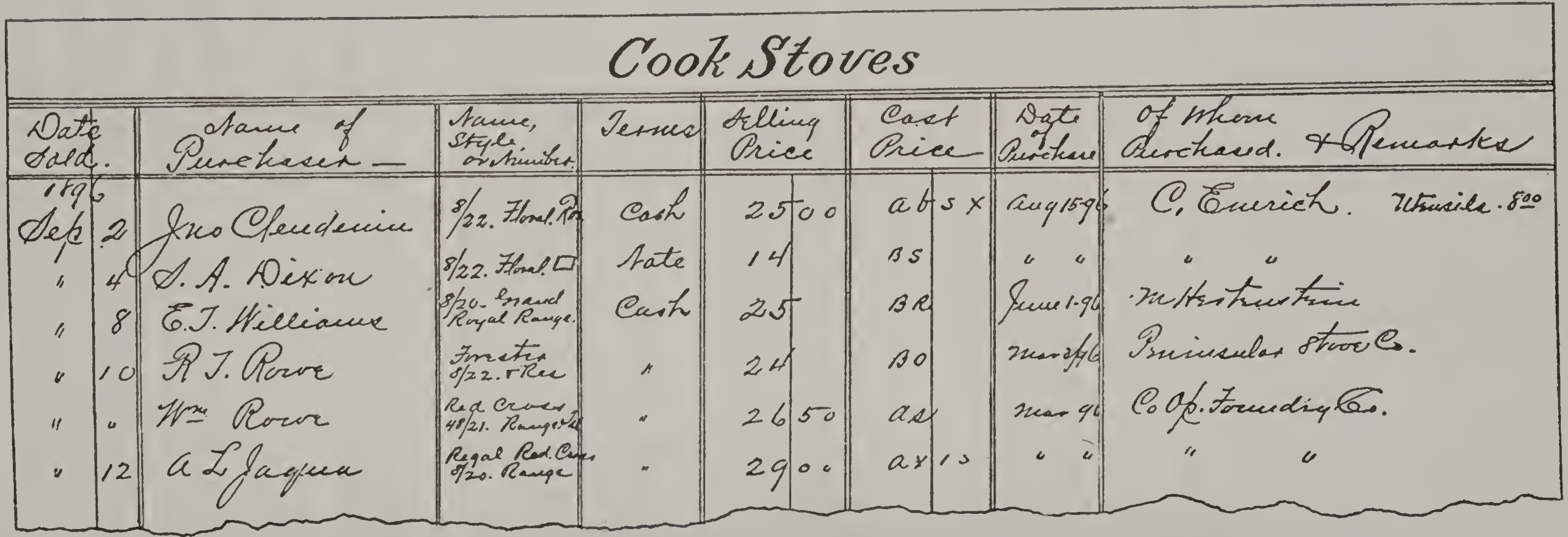
ORDER NO. 498
NAME. Smith, John.
ADDRESS. 397 Orchard St
Rec'd Jan. 5. 1905.
Repairs Ordered Jan. 5, 1905
By R. S.
From John Doe & Co.
Shipment Ordered Made Via R. R
Rec'd. Jan. 10. 1905.
Remarks. Telephoned Jan 10 Mrs S.
said. send Jan 11. 3. P. M.
Sent Jan 11. 3. P. M. Will Jones & C
Wilson. Fire in stove, Mrs S.
said. send Jan 12 at 3. P. M.
Repairs Put in. Jan 12.
By Will Jones & C. Wilson

BLANK & CO.
LANCASTER.
PA.

PLACE A
ONE CENT
STAMP HERE

Card on Which Rubber Stamp Has Been Used

In these days stove dealers throughout the country have repair orders for different kinds of stoves, and instead of sending these orders to the different manufacturers they order the needed parts from one of the stove-repair houses which make a specialty of carrying parts for a variety of stoves. And in this way one shipment may be made with one expense for postage and express or freight. These stove-repair houses are ready to pro-

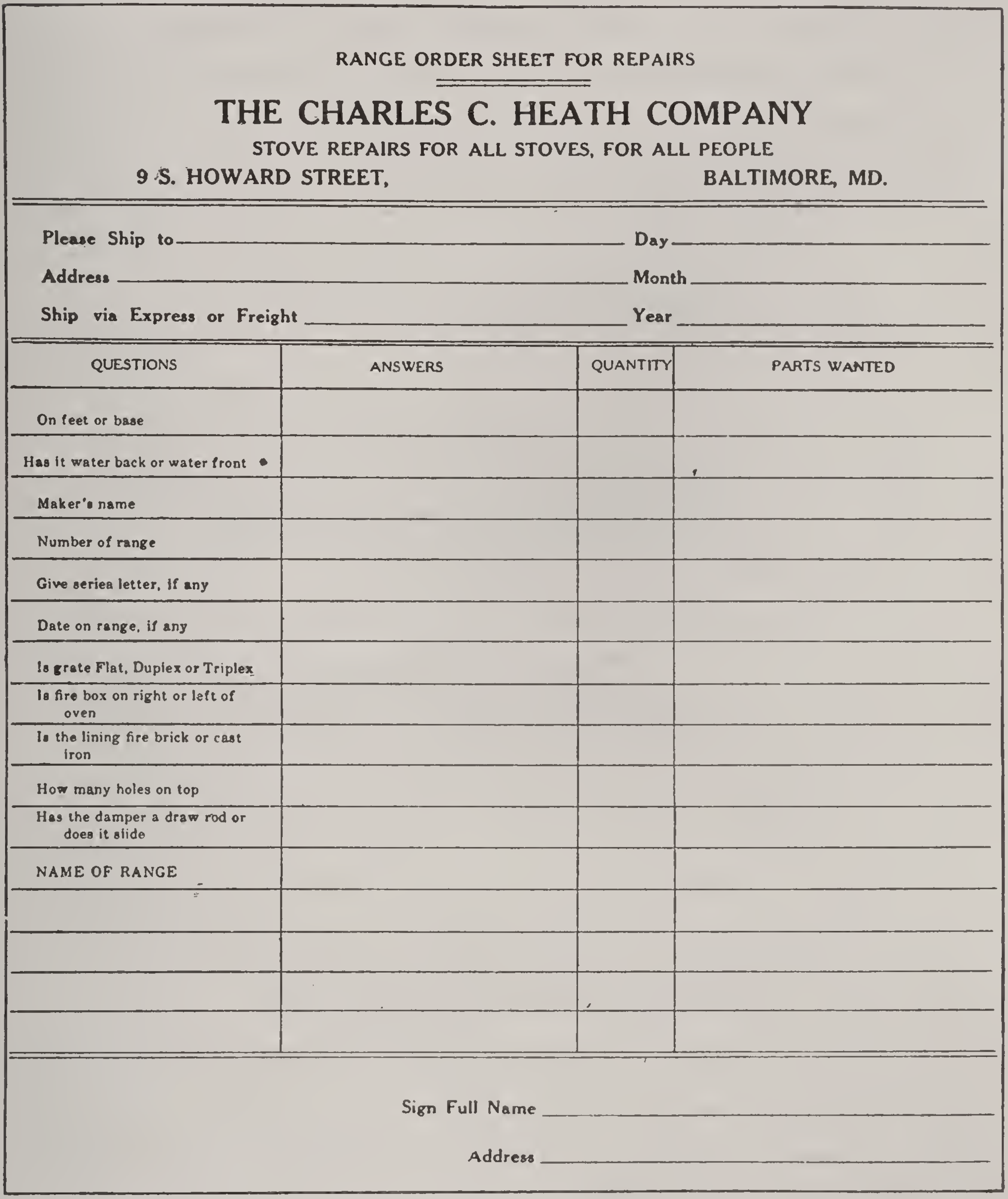


Cook Stoves

Date Sold.		Name of Purchaser —	Name, Style or Number.	Terms	Selling Price		Cost Price		Date of Purchase	Of Whom Purchased. & Remarks
1896 Sep	2	Jno Clendenin	8/22. Floral Ro	Cash	25	00	ab	5 x	Aug 15 96	C, Emrich. Utensils. 8^{00}
"	4	S. A. Dixon	8/22. Floral ☐	Note	14		BS		" "	" "
"	8	E. J. Williams	8/20. Grand Royal Range.	Cash	25		BR		June 1-96	M. Hertrustine
"	10	R. J. Rowe	Forester 8/22. & Res	"	24		BO		Mar 3/96	Peninsular Stove Co.
"	"	Wm Rowe	Red Cross 48/21. Range [illegible]	"	26	50	AS		Mar 96	Co Op. Foundry Co.
"	12	A L Jaques	Regal Red Cross 8/20. Range	"	29	00	AX	15	" "	" "

Page of Stove Sales Record Book

vide customers with duplicate blanks, by using which, with a sheet of carbon paper, a duplicate of the order sent to the repair house is kept by the dealer so that if more information is required by the repair house in reference to any part of the order the dealer can refer to his duplicate order.



RANGE ORDER SHEET FOR REPAIRS

THE CHARLES C. HEATH COMPANY

STOVE REPAIRS FOR ALL STOVES, FOR ALL PEOPLE

9 S. HOWARD STREET, BALTIMORE, MD.

Please Ship to ____________________ **Day** ____________

Address ____________________ **Month** ____________

Ship via Express or Freight ____________________ **Year** ____________

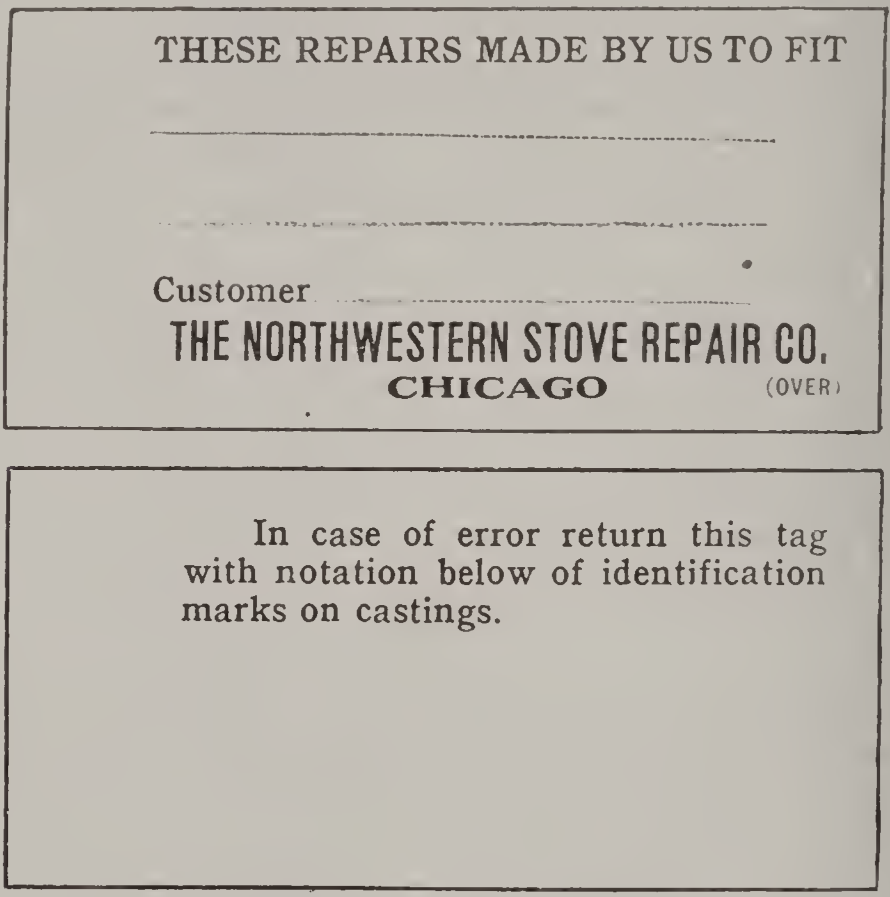
QUESTIONS	ANSWERS	QUANTITY	PARTS WANTED
On feet or base			
Has it water back or water front			
Maker's name			
Number of range			
Give series letter, if any			
Date on range, if any			
Is grate Flat, Duplex or Triplex			
Is fire box on right or left of oven			
Is the lining fire brick or cast iron			
How many holes on top			
Has the damper a draw rod or does it slide			
NAME OF RANGE			

Sign Full Name ____________________

Address ____________________

Range Repair Order Sheet

To reduce the cost and consequently increase the profit in handling stove repairs the dealer must make an early start by keeping a record of the stoves sold and of those which his workmen find in the homes of his customers. One method of doing this is shown in the accompanying reproduction of part of a page from the stove-sales record book of the Fulton Hardware Co., Portland, Ind. On this page is entered the date on which the stove was sold, the name of the purchaser, the name and style of the stove, the terms, the date at which it was purchased from the manufacturer, with the name of the manufacturer. Under such circumstances, when S. A. Dickson comes in and wants a new grate for his stove it is not necessary for him to go home, several miles in the country, possibly, and examine his stove carefully and get the name and date, because in the stove-sales record book the desired information is available.


THESE REPAIRS MADE BY US TO FIT

Customer

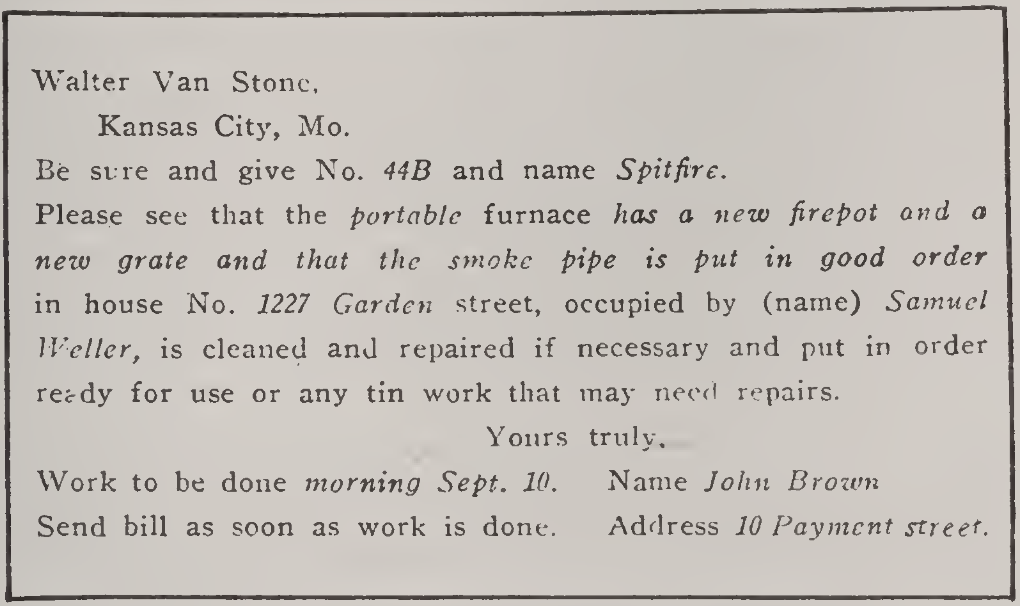
THE NORTHWESTERN STOVE REPAIR CO.
CHICAGO (OVER)

In case of error return this tag with notation below of identification marks on castings.

Front and Reversal of Shipping Tags

When orders for repairs for cook stoves and ranges are sent it is frequently necessary to state whether the stove burns coal or wood, whether it is soft coal and has a pouch feed, whether the oven is on the left or right of the fire-box, whether the grate is a triplex, duplex or a flat grate, whether it has fire-brick or cast-iron lining, six or four covers on the top. When this information is not received and is needed it is the custom of M. M. Corwin, New York City, and, in fact, of repair dealers generally, to send a postal card acknowledging the order and advising the customer that before the goods can be shipped more information must be supplied on the points which are enumerated on the card which is to be returned.

The Northwestern Stove Repair Co., Chicago, uses a slip reproduced herewith on which questions are asked, and similar slips are used in connection with different types of stoves.



Walter Van Stone,
Kansas City, Mo.

Be sure and give No. *44B* and name *Spitfire.*

Please see that the *portable* furnace *has a new firepot and a new grate and that the smoke pipe is put in good order* in house No. *1227 Garden* street, occupied by (name) *Samuel Weller,* is cleaned and repaired if necessary and put in order ready for use or any tin work that may need repairs.

Yours truly,

Work to be done *morning Sept. 10.* Name *John Brown*

Send bill as soon as work is done. Address *10 Payment street.*

Return Card as Filled in by Prospective Customer

In order to simplify the matter of getting correct repairs, the Charles C. Heath Co., Baltimore, Md., have four order sheets for ranges, cook stoves, heating stoves and furnaces, respectively. The order sheet for range repairs is reproduced herewith.

The questions asked on the cook-stove order sheet are as follows: "Is coal or wood burned?" "Is the grate in one or two parts?" Other information required is the name of the stove, number, date of the pattern, maker's name, brick or cast-iron lining, and if the stove has a front or pouch feed. There is also space for writing other information.

The heating-stove sheet requires the following information: Maker's name, number, style of grate, date, single or double heater, fire-pot in one or two pieces, self-heater or base burner. The information requested on the furnace sheet comprises style of grate, number of sections in fire-pot, name of the furnace, maker's name, date, number of furnace and if it has a letter, the series; if a sectional grate, the number of bars and if they are straight edge or interlocking and the style of the shaker.

Where the stove dealer orders repairs for different stoves for several different customers it is a common custom for stove-repair houses to do the favor and accord the convenience of keeping the repairs for each customer separate, putting on a small tag the name of the stove which the repairs are to fit or the name of the customer for whom the repairs are to be furnished. Some of the repair houses omit their name in order that the customer may not send future orders direct to the repair house and the dealer is protected in keeping the business which belongs to him. This character of protection is quite generally given in the repair business.

The small tag used by the Northwestern Stove Repair Co., Chicago, is reproduced herewith, while similar cards are used by S. N. Howes, Boston, Mass.; the Marcy Stove Repair Co., New York City; M. M. Corwin, New York City, and others.

With some houses, if a shipment cannot be made complete the customer is notified of the parts that are lacking so that if he desires he can order the other portion of the shipment forward and can have the remainder wait for another order from him or to come on as soon as they can be secured.

In a circular of the John B. Morris Foundry Co., Cincinnati, Ohio, it is stated that it is best to give all the information obtainable, such as the maker's name, stove's name in full and all the numbers appearing, including the latest date of patent, whether the stove has a pouch, top or front feed, on which side of the fire-chamber the oven is, whether the range has a reservoir, and on which end of the range it is attached. The further statement is made that when all possible information is given there is a very small chance of the castings which are shipped to the dealer being wrong, particularly in these times when all stove-repair houses have a complete and excellent record and method of handling their orders.

The United Stove Repair Co., Philadelphia, makes some excellent suggestions in literature which it issues, among which are that the stove-repair orders for the fall should be solicited from the citizens by the stove dealer during the summer so that the repairs may be secured and put into the cooking or heating apparatus before the weather makes it incumbent that it should be in constant use. Orders should not be accepted from a customer by the dealer until he is absolutely sure that both understand each other as to the parts wanted. The dealer should always keep a copy of the order for repairs he sends in and he should allow ample time for procuring or making those unusual parts which are not usually carried in any stock.

All repair houses dwell on the fact that when stove dealers are written for additional information it is because it is absolutely necessary to have the detailed description to fill the order correctly, and such communications should be answered as promptly as the information desired can be secured. Much loss to stove dealers would be avoided if a deposit were required when the order is placed. In many instances the dealer can very closely approximate the cost and if he requires a deposit of two-thirds of the price made it will reimburse him for the actual cost of the repairs and the charges for freight or expressage if his customer never comes after them, as is often the case.

In sending orders the dealer can record on the duplicate which he keeps for his own use whether they are to come by freight or express, the amount that has been deposited, the customer's name, to whom notice should be sent on their arrival and any notes that may be necessary as to the time the fire will be out, so that the repairs can be put in the stove, range or heater with the greatest convenience to all concerned.

A contributor a few years ago sent in a card on which a one-cent stamp could be attached and with his address in small letters in one corner. Both sides of this card are reprinted herewith. On one side of the card he had a letter addressed to himself, with the place for a customer to fill in the name of the stove and the other information as to parts and pieces needed for repairs. He had a rubber stamp made so when this card came in it was stamped and filled out to show the date the order was received, when the order was mailed for the repairs, how they were to be shipped, when they were received and when they were placed in the stove and the amount of the deposit. The distribution of such cards with a suitable letter in the latter part of the summer, it has been found, not only brings orders for stove repairs but orders for many other repairs to property, which makes the investment pay largely in the returns brought in.

Furnaces are as frequently in need of repairs as stoves. Walter Van Stone, Kansas City, Mo., sends a mailing card, which is reproduced herewith, to people who are likely to be in need of his services.

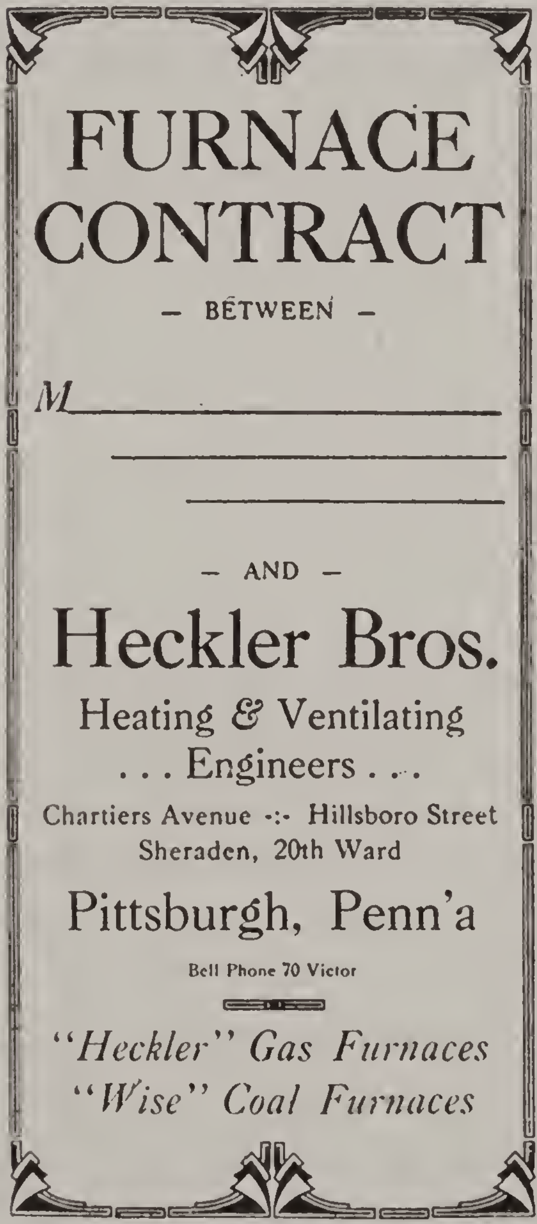
Some stove and furnace dealers have found a decided advantage in having a card which gives the name of property owners and the numbers of the different houses, stores or other buildings which they own, and in connection with each one of these buildings they have gathered and put on the cards the size and kind of heater that is used, with full particulars as to maker's name, number, date, and the kind of grate. The same card has the same information about the kitchen range, heating stoves, the kind of roof that is on the building and, if tin, when it was painted last, the character of the gutter, eaves trough and conductor and the condition they were in at the time last noted, the character of the bath-room equipment and kind of brass goods used, so that in case of a hurry order for repairs a reference to these cards will enable the customer to be more promptly served and a better profit made from the charge which is possible for the service rendered than if a visit to the property had to be made to get this information.

The various stove-repair houses report that far less attention is given to the suggestions made for avoiding error, delay and additional cost than should be given to save money to all concerned. It is essential that the man who hopes to be in the lead and to make some progress toward the accumulation of a competence for his old age, shall utilize every available suggestion for reducing expense, reducing the expenditure of energy, increasing the efficiency of his services and reducing the cost, so that his profits may be larger.

CONTRACT SPECIFICATIONS FOR FURNACE WORK

How Misunderstandings and Disputes with Customers May be Avoided in Making Settlements

Closely associated with the movement for better warm-air furnace installations is the provision of a written proposal and specification so that the customer may know as nearly as his ability will allow him to judge just what kind of heating system the furnaceman intends installing at the price named. It may seem to some that the trouble of submitting a written specification of the proposed plant is not worth while. It has been the experience of those who use the written specification, however, that they have fewer misunderstandings with customers and fewer troubles with settlements than they otherwise would.


FURNACE
CONTRACT
– BETWEEN –
M____________________
____
____
– AND –
Heckler Bros.
Heating & Ventilating
. . . Engineers . . .
Chartiers Avenue -:- Hillsboro Street
Sheraden, 20th Ward
Pittsburgh, Penn'a
Bell Phone 70 Victor
"Heckler" Gas Furnaces
"Wise" Coal Furnaces

Backing Sheet of Folded Furnace Contract

The form of proposal and contract used by Heckler Bros., Pittsburgh, Pa., is presented hereinafter as a specimen for those who may wish to adopt such practice. The specification proper is printed on a single sheet of paper 8½ x 17 ins. This sheet bears as a heading in large type the words "Proposal and Specification From." Then follows the name of Heckler Bros. and their address. On the margins of the heading is a sectional view of the Heckler gas furnace for warm-air heating and a view of the warehouse and office.

The proposal when filled out is attached to a backing sheet and folded so that when handed to a customer it has the appearance of the accompanying illustration, with the exception that the name of the customer is written in on the blank lines. On the inside of this backing sheet is an illustrated description of the Heckler furnace and the following selling argument.

"A mistake is too often made in believing that all furnaces are alike; that all contractors have equal skill and ability; that, therefore, the lowest bid is always the best bid. Nothing is farther from the truth. A heating contract is not like such contracts as the excavating, stone work, brick and carpenter work on a building, where all comers bid on the same specifications, and all are furnished with the same materials, and one may be as able as another to do good work. The skill required to plan a system of heating is more akin to the knowledge and experience exercised by a physician in his work, or a lawyer in his, or an architect originating a plan. It is an individual idea, and one man's idea and knowledge is often very much better than another's and one may secure the necessary results with a very much less expenditure of materials and money and fuel than another. The only real monopoly in this country is *brains* and he who secures the best brain work in the accomplishment of his object is likely to profit the most thereby. This is what makes the difference in the work of those who bid for your favor. The above is especially true of that class of work in which we belong—a business in which the ignoramus and inexperienced have very little place. For these reasons the highest of the bids which you may receive for the erection of the heating apparatus may be the very best for you to accept."

The specifications referred to herein are as follows:

To ....

We herewith propose to furnish and install a complete heating system in the house owned by you located at.................................. according to the following specifications:

All agreements are subject to delay by strikes, accidents or causes beyond our control.

Furnace: There shall be.. of size and dimensions as described in our catalogue.

The same to be set in the best possible manner for the equal distribution of warm air.

Smoke Pipe: Th smoke pipe to be.......inches in diameter and to be made of heavy galvanized iron, properly connected to the furnace and to be cemented at the flue with Portland cement. A damper is to be placed in the smoke pipe for regulating the draft.

Hot Air Pipes: There shall be.......hot air pipes connecting with the following rooms:

....

Hot air pipes to be made of best bright tin of suitable size to furnish an abundance of fresh, warm air; to thoroughly heat the rooms connected with the furnace and all elbows to be made with a free and easy curve to avoid friction.

Dampers: One close fitting damper to be placed in each hot air pipe to regulate the flow of air to the different rooms. These dampers will be placed near the furnace.

Cold Air: The cold air for the above heating system will be taken from the ....

....

Registers: Registers will be placed in the........of the following rooms ....

All registers to be black japan finish...............................

Pipe Covering: All hot air pipes will be covered with one thickness of 10-pound asbestos covering, the same to be neatly pasted on to prevent the heat from escaping to the cellar and to prevent the pipes from rusting.

Gas Fitting: The gas will be connected complete with all proper valves and regulators, ready to light the fire on all ''Heckler'' gas furnaces installed by us.

Guarantee: The entire apparatus shall be erected by experienced workmen and it shall be a first-class piece of work in every respect, and with the proper care and management will thoroughly heat all halls, rooms and chambers connected with the furnace.

All material and workmanship covered by the above specifications is guaranteed to be of the best quality, and new parts to replace material found to be defective within the period of one year shall be furnished free of charge.

Time of Completion: The above heating system shall be erected in a complete manner according to the foregoing specifications on or before....

....

Title: Heckler Bros. shall have a just and valid lien upon the heating system furnished under this contract, and the title to said heating system is to remain in their name until the full and final payment for the same shall be made.

Contract Specifications for Furnace Work

PRICE: The whole to be done in a complete and workmanlike manner for and in consideration of the sum of ($)..................... dollars.

TERMS OF PAYMENT: The terms of payment for the heating system described herewith shall be as follows:.................................
....

Respectfully submitted,

HECKLER BROS.

Per...................................

ACCEPTANCE: I herewith authorize you to install the heating system in my house as specified in the above proposal, which is hereby accepted and signed in duplicate this............day of..........................

Signed...

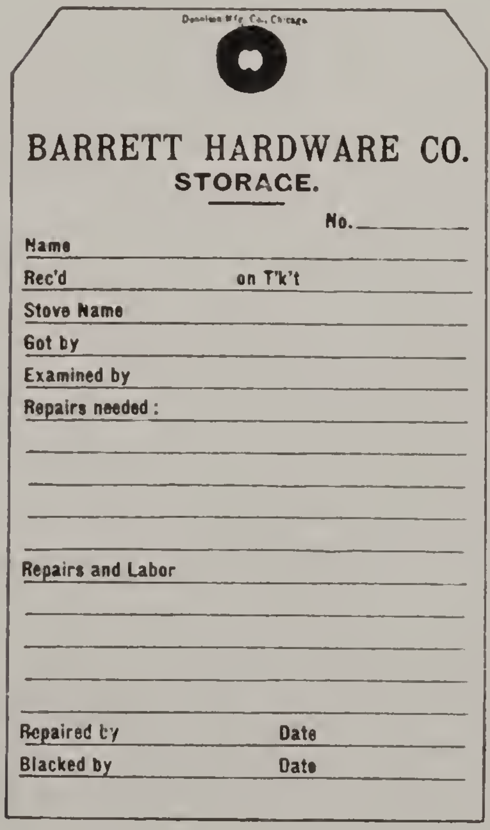
SYSTEMATIC METHODS IN STOVE STORAGE

Forms Used by a Progressive Company for Insuring Satisfactory Service to its Customers

A good income is made each year by the Barrett Hardware Co., Joliet, Ill., from the storage of stoves for its customers. Last year 500 stoves were taken care of at a charge of $5 each, making a total of $2500, and it is expected that this spring the record will be duplicated. For $5 the company takes the stove down, carts it to the store, stores it all summer, insures it for its value, cleans and polishes, and delivers and sets it up in the fall.

A buffing machine was installed about two years ago for polishing the nickel parts on stoves. Such excellent work was done that the following season there was a big increase in the number of stoves stored.

When the store sends after a stove in the spring a tag is placed on it before it is removed from the house. This tag gives the name of the owner, date received, the name of the employee receiving it, etc. There is a blank on the tag to fill in a list of needed repairs.



Dennison Mfg. Co., Chicago

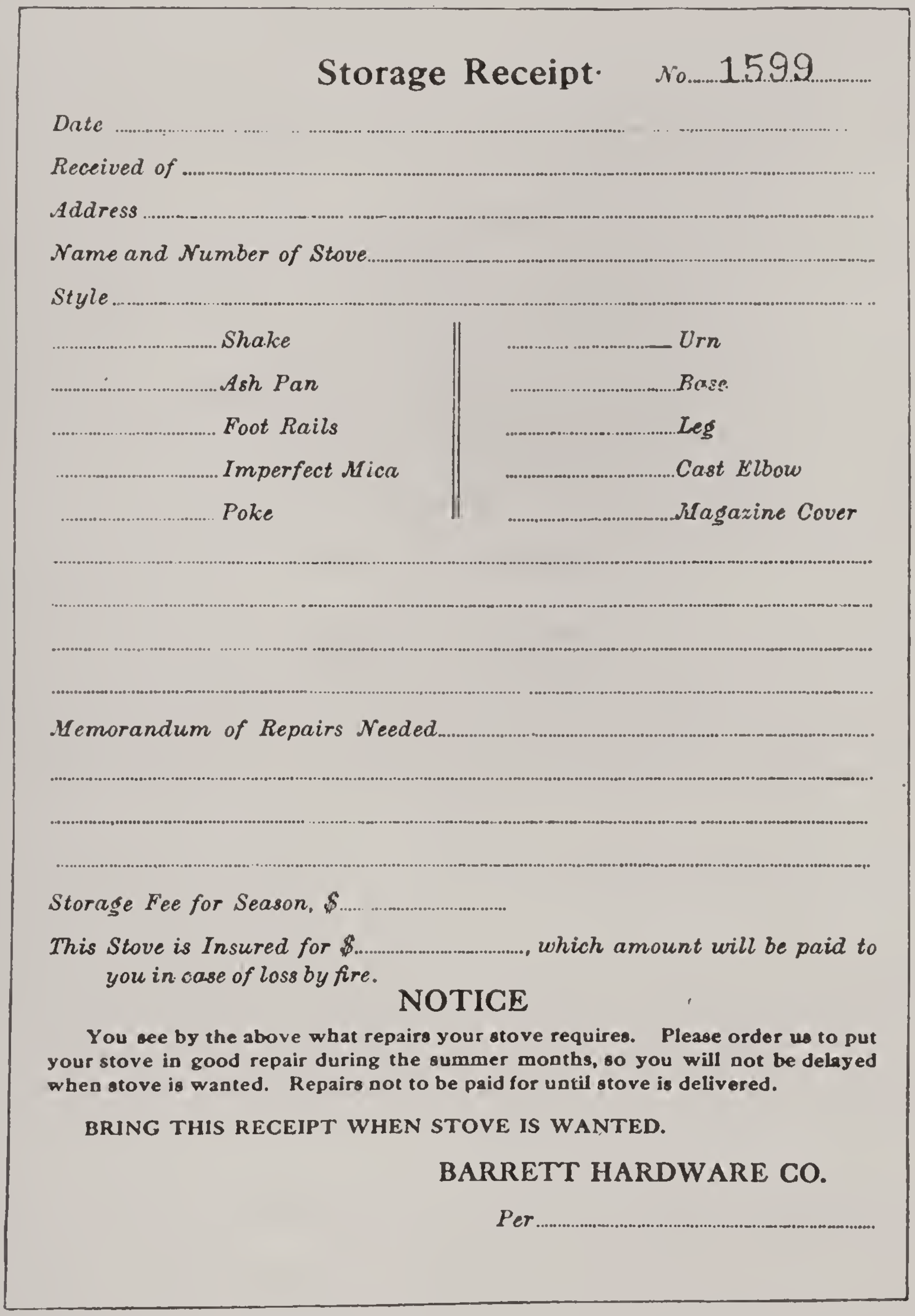
BARRETT HARDWARE CO.
STORACE.

No.
Name
Rec'd on T'k't
Stove Name
Got by
Examined by
Repairs needed :
Repairs and Labor
Repaired by Date
Blacked by Date

A storage receipt is made out when the stove reaches the store and mailed to the customer. The customer is obliged to state the value of the stove and this is put in the receipt and the stove is insured for that amount against loss by fire.

During the summer all stoves received for storage are examined carefully by the repair men and if any repairs are needed that the owners have overlooked notice is sent them and the repairs are made before cold weather comes again.

Three days' notice is required in the fall before stoves are delivered. The coming of cold weather suddenly brings a demand from many people for their stoves and at this time a big crew of men is put at work cleaning and polishing and as many as 48 stoves have been delivered and set up in one day during this rush season.



Storage Receipt No. 1599

Date

Received of

Address

Name and Number of Stove

Style

Shake
Ash Pan
Foot Rails
Imperfect Mica
Poke

Urn
Base
Leg
Cast Elbow
Magazine Cover

Memorandum of Repairs Needed

Storage Fee for Season, $

This Stove is Insured for $, *which amount will be paid to you in case of loss by fire.*

NOTICE

You see by the above what repairs your stove requires. Please order us to put your stove in good repair during the summer months, so you will not be delayed when stove is wanted. Repairs not to be paid for until stove is delivered.

BRING THIS RECEIPT WHEN STOVE IS WANTED.

BARRETT HARDWARE CO.

Per

Storage Receipt for Stoves—Note Insurance Item

The Barrett Company states that this is one of the most profitable departments of its business. There is a good profit on the stove storage charges and an additional profit on the repairs that are made. It also gives the company an opportunity to learn where new stoves are needed and frequent sales result when stoves are in such condition that it does not seem worth while to have them repaired.

DONT'S FOR STOVE DEALERS

A few days ago a reader wrote to the editors asking if they could supply him with a copy of an article entitled "Don'ts for Stove Dealers," published in these columns several years ago. He commented on the value of the article and his letter brought the suggestion for reprinting it as follows:

Don't speak ill of a competitor.

Don't advertise in a perfunctory manner.

Don't fail to be explicit in ordering repairs.

Don't forget that stove polish is a good salesman.

Don't bite on everything that comes along.

Don't try to carry orders for repairs in your head.

Don't attempt to carry too many lines; select a good one and stick to it.

Don't sell stoves that are difficult to repair; stove repairs, like chickens and curses, come home to roost.

Don't guarantee a small stove to do the work of a large one.

Don't expect a stove to work as well before it is paid for as after; it seldom does.

Don't guarantee a range to bake well if connected with a short chimney; it may not.

Don't use a smoke-pipe that is too small; better too large.

Don't trust a customer or other inexperienced person to put up a new stove; if possible avoid it.

Don't undertake to get stoves delivered without sufficient help; if broken in handling you will have the expense of repairing and probably a dissatisfied customer.

Don't urge a woman to buy a stove she does not like the looks of; if she takes it it will never be perfectly satisfactory.

Don't try to convince a prospective purchaser that he or she is prejudiced for or against any particular kind of stove.

Don't forget that, as the seasons change, the wants of the public change; and arrange samples and windows accordingly.

Don't snub the traveling man; you may want a favor at his hands some day.

Don't expect to do all the business done in your line, nor claim that you do it all.

Don't get the idea that dust and dirt will be overlooked in your place because it is a stove store.

Don't condemn without a hearing a range that does not bake well on the bottom; it may "talk" when connected with another chimney.

Don't forget that a few ashes spread over the top oven plate of the range will improve its baking.

Don't overlook the fact that a stove must have sufficient draft to work satisfactorily, and that the chimney and not the stove must furnish the draft.

Don't allow stoves to be taken out of the store until they are looked over carefully; filing and fitting after a stove is delivered arouses an unpleasant suspicion in the mind of the housewife.

Don't be "penny wise and pound foolish" in the matter of tools and appliances to work with.

Don't expect the stove repair branch of your business to run itself; it won't.

Don't have too many prices; the adoption of this rule will save you considerable annoyance and promote confidence in the justness of your prices.

Don't leave your store in charge of one who has not a practical knowledge of the goods; a customer wants and expects intelligent attention.

Don't forget that the average man or woman is more stupid regarding the needs, uses and general make-up of a stove than upon almost any other subject.

PREVENTING AND COLLECTING FREIGHT CLAIMS

Instructions Endorsed by Freight Claim Association Promulgated to Minimize Losses in Shipment—Suggestions on Collecting Claims

WITH a view to reducing the losses to shippers and transportation companies to a minimum three pamphlets comprising important suggestions have been promulgated by carriers to secure the co-operation of the shipping public. These have been endorsed by the Freight Claim Association, and extracts from them are given in the following:

HOW TO PREVENT CLAIMS

The bill of lading or shipping ticket prepared by shipper should be on standard form recognized by forwarding carrier; and since freight is forwarded under waybill, which is a copy of bill of lading, shipper should use every degree of care in preparing the bill of lading, making same legible, and observing the following rules:

Name of shipper, consignee and destination must be shown in full.

Whenever there are two stations of the same name in the same state, shipper must designate the county in which station is located.

Date of bill of lading must correspond with date shipment is delivered to carrier.

Articles must be carefully specified according to published classification of freight.

Care must be observed in comparing marks on packages with marks shown on bill of lading.

HOW TO PRESENT CLAIMS

The following documents should be submitted by claimant in supporting claim for overcharge in rate, classification or weight:

A. Original bill of lading, if not previously surrendered to carrier.

B. Original paid freight bill.

C. Original invoice, attested copy or such other evidence as may be necessary to prove the rate, weight or classification claimed.

D. Statement of claimant showing how overcharge is determined with reference to published tariff or other authority for rate, weight or classification claimed.

E. When for any reason it is impossible for claimant to produce original paid freight bill or bill of lading, claimant should indemnify carrier or carriers against loss by payment of duplicate claim supported by original documents.

F. The absence of any of these documents should be explained.

The following documents should be submitted by claimant in supporting claim for loss or damage:

A. Original bill of lading, if not previously surrendered to carrier.

B. Original paid freight bill.

C. Original invoice or attested copy.

D. Statement of claimant showing how amount of loss or damage is determined, with such other evidence as may be necessary to substantiate same.

E. When for any reason it is impossible for claimant to produce original paid freight bill or bill of lading, claimant should indemnify the carrier or carriers against loss by payment of duplicate claim supported by original documents.

F. The absence of any of these documents should be explained.

HOW TO COLLECT CLAIMS

Any loss or damage, immediately on discovery, should be reported to the agent of the delivering line, and every opportunity should be afforded him to inspect and verify the same, and in no case should report of this loss or damage be delayed beyond forty-eight hours after receipt of goods.

Delay in making complete investigation is sometimes unavoidable on account of the numerous agencies involved. It must be borne in mind that every claim must undergo some investigation, since reports of loss or damage are not always at the finger tips of the claim department.

Delay in adjusting claims for damages often arises through the refusal of consignee to accept property which has been delayed or damaged in transit. It should be understood that the acceptance of such delayed or damaged property does not in any way jeopardize any proper claim which the owner may have against the carrier; in fact, the law expressly provides that a consignee must accept his property and be diligent in disposing of it to minimize loss.

PROFITS FOR THE CONTRACTOR IN RIGHT BUYING

An Explanation of the Fundamental Principles Which any Contractor May Use with Advantage

By Frank S. Prior

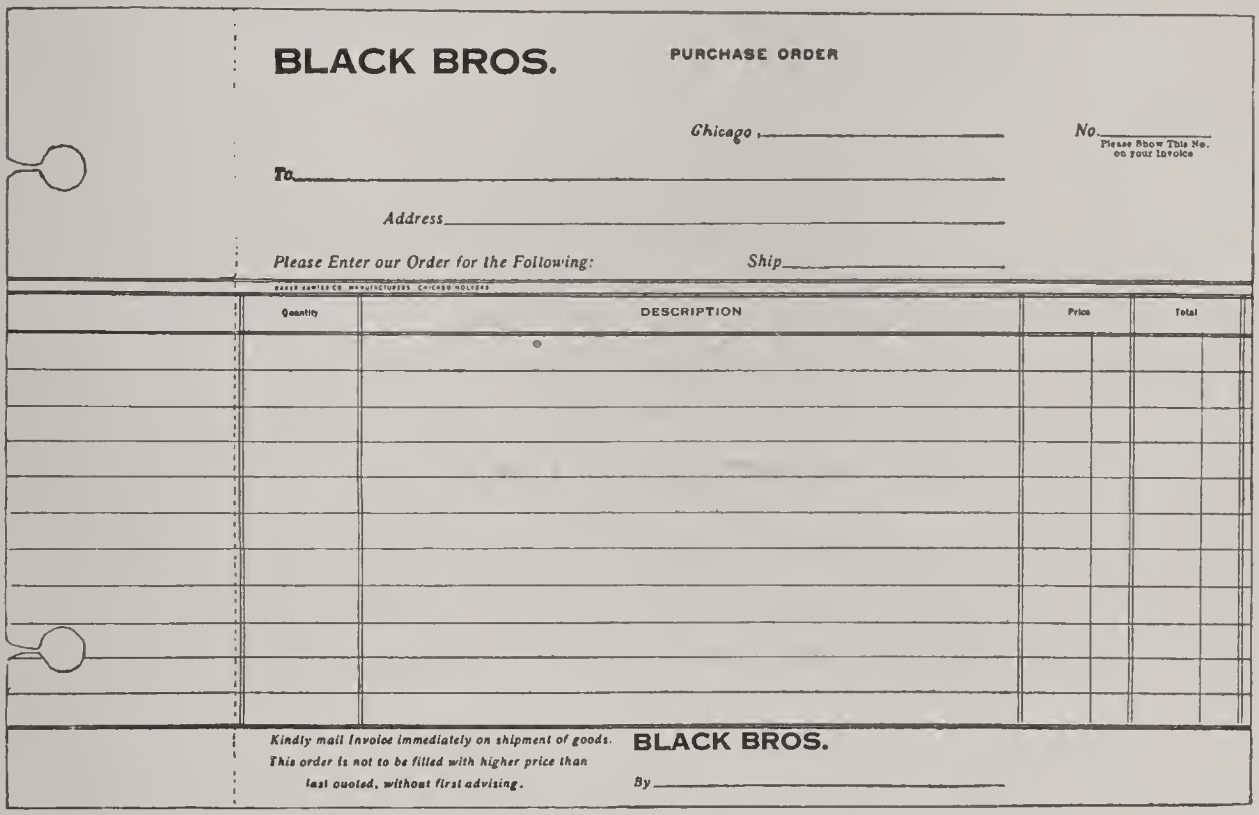
Buying or purchasing of the materials, goods or stocks necessary for the operation of a plumbing and heating enterprise is one of the branches of present day management worthy of thought, analysis and research. It is true that very little attention has, up to this time, been paid to the science of buying. It has not received the careful study, the investigation which has been centered on some of the other lines of management such as costs, salesmanship, advertising, etc. Yes, we can use this term, "science of buying," and do so judiciously when we must be free to admit that there is no other department in the management of the present day plumbing and heating enterprise that contributes any more to the success of the business than that concerned with procuring the necessary stock, supplies or goods.

Right buying is very much like that quality of constitution which successfully sees one through a siege of fever, we give it too little attention or credit until the doctor suggests that it is that quality of resistance which is equally instrumental and even has more to do with our recovery than his medicines. The real worth of anything develops only when put to the test and the real worth of a buying policy is not put to the test until called upon to assist in contributing toward the support of the business during temporary periods of hard going through which business tugs from day to day; yes, during the time when the manager finds it compulsory to reduce stock and buy only on a "hard time basis."

REQUISITES TO GOOD BUYING

When it is considered that buying requires not only keen, shrewd, business judgment, but also an unlimited amount of technical knowledge compactly arranged, it is very evident that the systematization of such a department or work is surely worthy of careful research, study and treatment.

While it is true that there are not innumerable buying methods available for the plumber and fitter's use, any hard and set rules for him to follow, designed or arranged by buying experts, as we find in some of the other branches of management, such as cost methods, selling methods, advertising methods, etc., yet there is at hand and possible for his procuration much valuable information and statistics which can serve as a concrete foundation upon which he can start right buying methods—information of systems. While it is hardly possible that he will become an expert statistician, this not being necessary, yet with the assistance of possibly his bookkeeper, he can gather and arrange this information which may



BLACK BROS. PURCHASE ORDER

Chicago, ____________ No. ________
Please Show This No. on your Invoice

To ____________

Address ____________

Please Enter our Order for the Following: Ship ____________

	Quantity	DESCRIPTION	Price	Total

Kindly mail Invoice immediately on shipment of goods.
This order is not to be filled with higher price than
last quoted, without first advising.

BLACK BROS.
By ____________

Blanks for Forms 1, 2 and 3. These are Made Out Simultaneously by the Insertion of Carbon Sheets produce better profits for him, or at least be of material service to him as a buying guide.

Practically the only methods or systems in the past for the average plumber and fitter have been the scattered articles in the trade magazines; to exchange information with possibly a brother craftsman and then bring the result of experience to focus on the science to its mastery. While it is true that there are not any cut-and-dried systems at hand, yet it is possible for him to compile and record facts which can prove very serviceable data to him, and such data systematically compiled and recorded will formulate for him a buying system or method.

Yes, we know that the plumber and fitter has been a little skeptical in the past as to the advisability of letting Mr. System into his business. Plainly speaking, this outsider must be let into the business—into the plan laying. Mr. Outsider will prove his efficiency, but can only do so when given an opportunity. This Outsider, if he be efficient, can come into our business and show us a great many places and things which have been overlooked, been mismanaged, been neglected every day in our management. We need the other fellow's viewpoint frequently and it will pay us to get it at any reasonable cost. The most expensive thing which one can get into his business is that opinion that he knows all that should be known about it.

It has been said that: The greatest business discovery of *yesterday* was that *service* is the *heart* that pumps the lifeblood of business. The greatest business discovery of *today* is that *accurate knowledge,* and *not guess work* or *personal opinion,* is the basis of sound, practical judgment. The greatest business discovery of *tomorrow* will be that no business man is properly equipped for his vocation for rendering *profitable service* until he has *accurate knowledge* and *sound practical judgment* regarding *economics, political science, sociology* and *humanics.*

ELEMENTS OF RIGHT BUYING

The elements of right buying and their source press surprisingly heavy responsibility upon the head of the buyer, whether he be a manager of a plumbing and heating enterprise, or the purchasing agent for one of the largest corporations. There are certain elements which he must necessarily possess or make effort to attain. For instance:

First—Common sense.

Second—Ability to read human nature.

Third—Knowledge of market.

Fourth—Knowledge of sales and purchases.

The first essential, common sense, is the one we so often find lacking in some of our very best trained men, the one that underlies excellence in all trades or professions. How often we can see the vast amount of technical knowledge, as that had by the physician and surgeon, rendered, worthless by the lack of good judgment and common sense, on the part of the one otherwise a trained man.

The buyer must have a common sense view of his responsibilities, of the wants of his business, of the wants of his customers and the general conditions surrounding the trade.

He must have tact, that ability to decide upon the right thing at the right time. He must acquaint himself with the art of handling men, of meeting and associating with men, that art which calls to exercise that shrewdness which enables a man to be a capable reader of human nature, of character, of possibly the inclinations and motives of the clever salesman who is endeavoring to close with him on a big order. We all know that there exists a certain antagonism between the salesman and the purchaser, to some extent possibly friendly, each is trying to close the transaction, drive the deal to his own benefit, the salesman endeavoring to sell his goods at the highest price possible and the purchaser to procure those same goods at the lowest possible price.

The basis upon which every buyer works is knowledge of markets. He may study it day and night, study it faithfully and yet can never expect to possess more than an elementary knowledge of the subject. There are so many elements which have to do with the rise and fall of market prices which makes it almost impossible for a human mind to conceive more than the possible, and never the positive, inclination of the prices. The fact that a certain price rules is no sure guide; the shrewd buyer must look beyond the mere price and reach into the cause which made that price and those that are material in its remaining at that point or in causing its fluctuation up or down. The good buyer must be a good anticipator, he must take certain facts as a criterion and upon this build a future which will *save money.*

The stock requirements of no two firms are alike, and for this reason alone, no cut and dried buying methods are available, the only procurable basis being a carefully prepared schedule of past sales and purchases. There is no better way of judging the probable future than by that which really took place in the past, therefore the successful buyer must necessarily have at hand a comprehensible record of past sales and purchases in order that he may possess that essential: knowledge of past sales and purchases.

THE MEANING OF RIGHT BUYING

The first meaning which is brought to our minds by the term, right buying, is synonymous with "Close Buying," "Cheap Buying." Yes, we say right buying is buying cheaply or closely, and yet we have not answered the question satisfactorily. The whole science reduces itself to the one great question, *when are goods, supplies or stocks well bought, bought rightly, bought closely?* Is it when the greatest quantity is obtained for a certain price, is it when we have saved or made possibly an initial 10 per cent. saving through a quantity purchase? Most decidedly no. The new term, close buying, carries with it a more important element than possibly the saving of an initial 5 or 10 per cent. The new and scientific meaning of close buying is that of ''buying close to demand,'' the shortening of the time between purchase and sale down to the lowest possible point.

The close buyer may be designated as one who is successful in getting the best value or worth for his money, this worth consisting of intrinsic, time and locality worth. In order that he be successful in getting the very best value or worth he must recognize values as soon as he sees them. This is the sum and substance of so-called shrewdness in buying, and in order that he recognize these qualities he must have knowledge of the following values:

First—Intrinsic worth.
Second—Time worth.
Third—Location worth.
Fourth—Buying market.
Fifth—Selling market.

Those who are recognized as being in the forefront of the ranks of successful buyers throughout the country have at the basis of their buying knowledge, intrinsic worth, the genuine, essential or real value of a product. To be able to sense—either intuitively or scientifically—the true or genuine value of an article or product under exact or adverse conditions is one that largely determines the capability of the buyer. Modern advertising methods at times depend so little upon the real value of what is to be sold and lay so much stress upon salesmanship, that intrinsic or real worth is sometimes lost sight of.

Time worth involves especially the new meaning of the term ''Close Buying.'' There are two interpretations of this term ''Time Worth,'' one having to do with seasonable buying and the other having direct connection with the theme of shortening the time between purchase and sale. In a business like that of plumbing and heating, it is the latter which is more worthy of consideration. The plumbers' and fitters' business, when considering buying methods, is a trading concern; that is, one engaged in the purchase of goods—finished goods—with the intention of subsequently selling the same at a profit. The shortening of time between purchase and sale is very worthy of the study of the plumber and fitter, as it should be his aim to obtain as frequent turnovers on his capital so invested as possible. The secret of his buying for profit lies plainly in the fact that success will depend largely upon the manner in which the amount of stock is kept at a minimum, not to the extent of impairing possible sales, but the keeping down of the capital so invested, down to the border line of good reason, and the frequency with which his capital so invested is turned. Turnover is a term applied to that cycle of operations which starts with cash and ends with cash. Capital is invested in stock, this stock is sold, and the money is released for replenishment of the stock. The money has been used (presumably with profit), and returns, ready to enter upon another period of usefulness for its owner.

Right buying has therefore reduced itself to the science of procuring such quantity and quality of goods at a fair buying value as will result in the rendering of the most satisfactory service to our patrons, at the same time rendering us the greatest frequency in turnover. This especially is the much sought element worthy of our study when endeavoring to seek out the attractive mediums in modern buying methods and their results.

BUSINESS METHODS, NOT COMPETITION, TO BLAME

The lack of reasonable turnover and the overhead charges against the numerous leftovers is largely responsible for the small showing of net gain, supposedly due to lack of proper management in some of the other lines of superintendence. Sometimes we say, "Competition is severe, it is preventing the existence of reasonable remuneration for our services," consequently competition receives the blame, while if we would with care analyze our buying methods, possibly we would find still a greater influence having a tendency to impair our earnings than that found through competition or mismanagement in some of the other avenues of superintendence.

DANGER IN OVERBUYING

We must beware and use our best judgment when called upon to pass upon judging the time worth of a purchase. There are innumerable purchases made in unreasonably large quantities just in order to save, or with the thought of saving possibly an extra 5 or 10 per cent. or possibly in order to receive the benefit of a freight allowance or some other seemingly apparent benefit. But the overhead charges against that portion of the purchase which has not moved soon eat up not only the initial saving of the 5 or 10 per cent., the supposedly saved freight charge, or whatever the supposed saving was, and possibly the profit made on that portion of the purchase already sold.

We should remember that each item of material or stock has an average period; the time it normally occupies in stock between purchase and sale. When it exceeds its average time in stock it commences to lose money for us and the purchase ceases to be a profitable one. The initial saving of 5, 10 or 15 per cent. realized by buying a car of soil pipe and fittings or bathtubs can and will soon be eaten up, together with additional savings or profits, providing the average rate of consumption is not large enough to insure the profit on purchasing in such quantity. The rate of consumption must be sufficiently heavy that the leftovers after a certain average period, and the investment against them will not overlap the profits already made on that part sold or the initial savings through a quantity purchase.

Locality worth, buying and selling market are also elements worthy of careful study. Locality worth has especially to do with the judicious selection of the proper stock for the business, and the suitability of the products to the locality in which one is operating. Buying and selling market knowledge is the result of the study of what the market has done and the "*Why*" of its so doing.

With the exception of trust commodities, there is a reason for fluctuation in prices. Trust prices are varied only as it is thought advisable by those manipulating the trusts, while the prices of all other articles may be said to be governed by the laws of supply and demand. Study can be put on these laws until they become comparatively familiar and lines studied in connection with the demand or the supply enable the buyer to determine which lines are liable to rapid or erratic fluctuations and which are governed by rule.

Therefore close buying means to the plumbing and heating manager the exercise of scientific methods so as to procure the goods or stock needed at a fair buying value in such quantities or amounts so distributed as to leave a small percentage of old stock or leftovers, and is only accomplished by the organized knowledge obtained from combined analysis, study, research and experience.

THE MODERN BUYING SYSTEM

Now comes the question, how are we to outline for the plumbing and heating manager a modern buying system, a system which will answer all of these requirements, tell him wonders about his stock, point out to him the items moving fast and those slow, those items reaching the minimum point and a thousand other needs? This all could be met by an elaborately designed system possibly too complicated and expensive for the average plumbing and heating business and still this should be remembered, we cannot afford to ignore the problem entirely, the thing to be done is to seek a system which will serve and answer at least a few of these innumerable requirements keeping the cost of the system down to the border line of good reason.

The first requirement in any buying system would consist of some systematic method of recording all orders given, of all unfilled orders, and a dependable check on all goods received. This requirement can be met only through the use of an efficient purchase order system.

The purchase order system, as outlined, consists of only three forms, hereafter known as Form 1, Form 2 and Form 3.

Form 1, the original, is the one upon which all orders are written, this copy going to the supply house, while Form 2, an exact copy provided at the same writing, is the form to be retained for the plumber and fitter's office record.

Form 3, which is also provided at the same writing, is the form which will serve as the receiving record, and by use of a short carbon no quantities or prices appear, the reason for which will be explained later.

In explaining the workings of the system it might be said that Forms 2 and 3 are filed alphabetically in a current binder, these forms showing the manager or buyer at all times, goods ordered, in transit, received, etc., preventing the common error of duplicating items and numerous other mistakes which are liable to occur.

These forms rest in a current binder until the shipment comes in, at which time Form 3, or the receiving record, upon which no quantities or prices appear, is given to the receiving clerk or anyone checking in the shipment. Through this plan it becomes necessary for him to record the quantity actually received, thus making this part of the work and insuring more careful attention; also through this method no employee is granted the privilege of looking over the prices paid for certain items of stock, as no prices appear on this record.

Form 3, or the receiving record, is then returned to the office and associated with Form 2 in the current binder, where they rest until the purchase invoices come in and are checked against these forms as to quantity received, prices, terms, etc. Form 3 has now served its purpose, providing the order has been filled correctly. Form 2 is now filed in a filled order binder where it remains for future reference.

AUXILIARY BUYING RECORDS

There are numerous other auxiliary records and forms which would be necessary in a modern buying system, but mention will be made of only a few of the most important.

First of all, there is no record which will assist the buyer more than an accurately kept stock record. This will inform him when the minimum and maximum points have been reached in stock carried on hand and numerous other services which could only come from an accurate stock record.

Then the buyer can make good use of a goods wanted register, in which are recorded items of stock running low. This record can be made up in book form, or consist of a card system, the card system being more efficient on account of the convenience in which the various items of stock can be arranged. When any item of stock reaches the low mark, a metal marker is put on the card indicating the item running low, this bringing same to the attention of the buyer when visited by the salesmen or ordering otherwise.

Good use can be made of a quotations received record, in which are recorded all recent and special quotations.

A cross index of catalogues, circulars, discount sheets, etc., will give the buyer immediate reference to this data. Let us remember that the plumber and fitter's library will consist largely of this matter and great care should be given the filing and indexing of this valuable information.

RECORD OF GOODS RETURNED

One record which will be necessary for the buyer's office will be the goods returned register, in which is recorded all returns by the plumber and fitter, whether for credit or replacement, this record being positively necessary when endeavoring to figure out the net amount purchased of any particular item of stock.

KEEPING RECORD OF PURCHASES

One of the most efficient and service rendering records will be that of a classification of purchases. This record can consist of a bound book having several columns to meet with the required classification of the items which the purchaser wishes to analyze. Record is made from the purchase invoices from time to time, the close of each month being the advisable time, of the various amounts purchased and returned. The net amount purchase plus the previous inventory, less the present inventory, will point out to the plumber and fitter his annual consumption in the various items of stock. For instance, he purchased during the year 200 bathtubs, returned 5 for credit, had 25 on hand on January 1, 1915, then at the close of the year, or on December 31, 1915, his tub stock consisted of 27, his classification would point out to him that his yearly consumption was 193 tubs, an average of over 16 per month. This information can be of much service to the buyer in contracting for future shipments, giving him some idea as regards monthly consumption, materially assisting him in specifying shipments closer to sales and thus cutting down stock investments and creating more turnovers on the capital so invested.

Various other forms and records can be arranged by the buyer which simply record facts and figures in a systematic and comprehensible manner, and all this necessarily constitutes what is known today as *the modern buying system.*

TEN POINTS THROUGH RIGHT BUYING

1. Buy close to demand, for a quick turnover, shorten the time between purchase and sale down to the lowest possible point.

2. Study and record the whims, desires, demands of your customers and buy only such goods as best suit their wants and not the goods you like best, or which would possibly promise to render the largest initial profit.

3. Don't buy too easily; that is, do not rely or depend too much upon the one selling you; attain sufficient knowledge of character analysis, to permit you to diagnose the intention of the one passing out information to you in regard to market conditions, etc.

4. Buy for as few leftovers as possible. We must remember that leftovers are an infallible index to the kind of buying which has been done, granted, of course that the selling end of the management has done its share toward the disposal.

5. Buy, if possible, in quantities, reserving the right to specify in amounts so distributed as to leave a small percentage of odd stock and leftovers.

6. Buy the best goods, not necessarily the highest priced lines, but the goods having the best quality and which will give the best service—service which gives satisfaction and profit to both you and your patron.

7. Buy the goods, stock, appliances or equipment you need, remembering that if you need an appliance in your business it is likely it will cost you more to endeavor to operate without it, or not to supply that need, than the article itself would cost.

8. Buy only under the guidance of a system or method. Remember the saying of one of our business wizards: "Give me a buyer with very little experience, but who uses a system, insuring few leftovers, frequent turnovers, in preference to the man gray in market knowledge and old in contact with goods, who refuses the guidance of a buying system."

9. Buy the service of sober and industrious workmen, those who will render your patrons service to the end of satisfaction.

10. Buy only the best advertising, selecting the best *mediums,* preparing the best *copy.* Remember that advertising without good copy is like a wooden Indian in front of a cigar store: It locates the store, but does not say anything.

HE WHO WORKS OR PLAYS WITHOUT PLANNING IS ALWAYS "UNLUCKY."

—SHELDON.

MAKING THE DEBTOR PAY

System in a Vital but Much-Neglected Branch of all Business

By A. E. Hockwalt*

Credit, as in vogue today, is probably the most neglected and most consistently abused branch of every business. This is a conclusion reached by statistical figures of unquestioned reliability. These records vividly depict the amazing number of losses occasioned each year from neglect of this important item.

A business is basically dependent upon its sales; its sales must be remunerative if the business is to be successful. And this is governed only by the credit. Therefore, the credit is practically the foundation of the business. It cannot receive too much attention. Every credit account has three distinct stages of existence:

THREE STAGES OF A CREDIT ACCOUNT

First, before maturity; second, at maturity, and third, the stage of the account when it becomes a collection. Some work is necessary before an account becomes a collection, for when it matures and before it reaches the third stage we should send the debtor a statement, to which statement should be attached a courteous request for settlement, together with a notice of draft to be drawn at a certain specified time.

There will perhaps be 50 per cent. of your customers who respond to this solicitation; the other 50 will allow you to draw.

Forty per cent. of the debtors drawn on will pay your draft and 60 per cent. will return them unpaid, and in the major portion of cases no explanation is offered by the debtor for his conduct.

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*Credit Manager of the Berger Manufacturing Co., Canton, Ohio

It is this 60 per cent. that causes all the trouble and work. Their excuses, when pressed, are varied. It is either ''No funds,'' ''Unable to make collections,'' ''Amount not correct,'' ''Did not receive invoice,'' ''Did not receive statement or notice of draft'' and ninety-nine other excuses to delay a settlement.

Right here we desire to refer to the mailing of bills and statements. The United States postal laws allow the transmission of a package of first class or letter mail weighing an ounce for two cents, and there are occasions when it is good business to utilize all the weight allowed. When it comes to sending bills and statements—it is another matter, and we believe it good business to let the government make a profit on this particular mail.

SEND NO PRINTED MATTER WITH BILLS

We recommend that under no circumstances you allow any advertising matter to be enclosed with a bill or statement, for when you send a statement you want the debtor's attention, which, to gain, you must hand him the statement alone, so that he will see clearly that you are requesting him to meet his indebtedness. Printed matter with a statement or bill will distract the attention of the debtor from this most essential point.

NO PRINTED FORMS FOR COLLECTIONS

Assume that a statement was sent a customer and he made no response or settlement. Draft was made on him —still no response or settlement; and our account is in its third stage. It has become a collection and in handling it we recommend that no printed forms be used. It is surprising to note that many houses indulge in the free use of printed forms. Do they not indicate to the debtor that the house has a great many delinquents or slow accounts?

The point is to give the delinquent customer the impression that everybody else pays up promptly and that he is the object of special attention because he does not pay. Your customer knows that he is not the only delinquent, but why remind him of it by means of a printed form?

Our letters do not necessarily need to be specially dictated, but they should be written and mailed out as if they were. By this we mean that forms may be used for the sake of convenience and economy of time. Supposing we make thirty drafts all on the same day. Twenty of these come back unpaid and without explanation. We here have twenty cases that are identical and a letter that fits the one would invariably fit all the others; hence it would be a waste of time to dictate twenty separate letters. A good form in the hands of your stenographer will relieve you of this work. She should, however, write and mail these letters addressed as if twenty separate and special cases.

Now, two-thirds of these letters will not be answered, and, again, a form letter will apply to twenty or more cases, and your stenographer can send these out at no cost of time or worry to you. So you see a series of forms can be used that, to the debtor, appear to be especially dictated letters, appealing to him as one individual debtor who has not paid.

There is nothing quite so exasperating as a man who will not correspond. We may gain something from a letter, even if ambiguous or obscure. We may be amused at angry and insulting letters, but what are we going to do with a man that holds his peace and our money? Write him letters, letters and letters; and it is right and proper that each succeeding letter sent him be a little more insistent than the last; this, of course, in a case where the debtor continues silent, where no answer whatever to your communication has been received, and there is no room for any but routine work. We classify our accounts, which is also right and proper, but it is a mistake to be too generous in this classification on the ''Go easy, we may offend him'' list.

HANDLING THE GOOD BUT SLOW ACCOUNT

We know that we have customers who are good but slow, and these as a rule, are very sensitive and it requires tact to handle them. We have noticed that the feelings of some of this class of customers are easily hurt, and they get the impression that the wound thus given is a sort of offset to their indebtedness.

In wording our letters we should be guided somewhat by our knowledge of the customer's standing and reputation, and here again we say that a good form letter will not only lessen our work, but also the liability of making errors, so common in the collection department. These errors consist in writing sharp, cutting letters, which, if we had held over and reread the next day, we would not have mailed. It is impossible for us to maintain a mild, gentle and well balanced temperament day after day, and we are especially apt to be severe on days we receive information of a failure in which we are caught.

Let us agree that, notwithstanding care and caution, there will be some part of our business unsatisfactory; there will be loss because of error in judgment or because of conditions, that have changed since the purchase was made and the credit extended, but let us not at the end of any year be obliged to charge off to profit and loss bad debts arising from an unavoidable cause. Lack of method, carelessness, fear of losing a customer by demanding money that is ours, neglect to follow up a delinquent and many other like causes.

The use of the series of form dunning letters usually got the money at some stage of the game, and where it failed it was useless for a collection agency to try its hand except by a suit at law.

CLOSE COLLECTION METHOD AND KEEPING BUSINESS

One thing is very necessary in the collection of accounts, and that is persistency. Give your debtor ample time to answer your letters, but don't let that time be more than enough. Five to ten days, according to where he is located, is sufficient, and if you have the idea that a close collection policy will lose business and friends dispel it, for it is the reverse.

The man who owes you nothing is more certain to be your friend than the man who is in your debt. Of course you can encourage a man to buy goods although delinquent. Then, too, there are those who are not subjected to a dunning system; assume that you don't need the money; hence don't trouble to send it. Their credit is presumed to be good and they use it freely. We have noticed occasionally a customer succeeds in having orders filled although three to five months delinquent. This is a bad policy and should not be indulged in.

DISASTROUS TO ENCOURAGE DELINQUENTS

The credit of a customer who is delinquent should be promptly suspended; he should not be allowed to increase his accounts, at least not without showing cause why he has not paid or cannot pay. It is observed that the majority of our customers who are slow employ lax methods. They are either free in giving credits or they do not push their own collections with the necessary and proper vigor. Such policy will sooner or later work havoc. Someone is bound to suffer a monetary loss, and, as a general thing, it is the creditor who suffers most.

The customer has mismanaged with our funds, and, after all, is it not partly our fault? Was it not our leniency that encouraged this mismanagement and consequent disaster? Your policy toward a customer can be made his policy toward his customers. Urge him and he in turn will urge his debtor. Nothing is more fatal than to allow collections to drag along. When a customer has not asked an extension, nothing should be taken for granted. The burden of asking favors belongs on the debtor and there it should be placed without question.

PERSISTENCY IN SYSTEM OF COLLECTING

Let us without fail have all statements accompanied by notice of draft and let us be sure that our drafts go out on the day scheduled, not a day sooner or a day later, but on the very day scheduled. Where a draft is returned, do not allow it to lie around for several days before writing the debtor. Write him at once on the day the draft comes back, or not later than the following day. File your letter ahead so it will come up in five or ten days, but file it so that it can be easily located if an answer is received. If no answer is received be sure to request one at the expiration of the time allowed your customer to respond. Every ten days or three times a month is not too often to write a customer owing an overdue account. He will soon learn that you are watching him, and if he must make anybody wait it will be the creditor that is not after him except with a statement once a month with some threadbare phrase stamped upon it.

ORDERS PLACED WITH HOUSES WITH SETTLED ACCOUNTS

He has paid you because you urged him and he now has an order to place. Will he place it where his account is square or will he give it to your competitor, whom he is owing an account overdue? Let us take a chance on the first proposition. It looks the more favorable. The following we find a good method of handling accounts; but, remember, you must keep right on the firing line. When you start, don't relent. Spasmodic efforts are ineffectual, persistency alone gets good results.

Statements are made the last week of the month and are made only of accounts overdue and to become due within 30 days. These statements are classified; that is, they are separated into groups. Past due accounts go into one group; accounts due between the first and tenth, into another; accounts due between the tenth and fifteenth of the month into another; those due between the fifteenth and twentieth, into another; those due between the twentieth and twenty-fifth, into another, and those due between the twenty-fifth and thirtieth, into still another. You will see we have here six groups of statements and these are mailed out on five different dates of the month. The second group goes out the first of the month, the third on the fifth, the fourth on the tenth, the fifth on the fifteenth, the sixth on the twentieth.

NOTICE WITH FIRST STATEMENT

In each case the statement is mailed ten days before the account becomes due and is accompanied by a notice to the effect that should the recipient not be heard from in ten days after the date of the invoice, it will be assumed that the recipient prefers to have a sight draft drawn on him.

We find it advantageous to send out or mail statements outlined, as they reach the debtor just a few days before the account is due and rob him of the opportunity to claim he got no notice that we intended to draw. Where statements are sent out in a lump only one-fifth of them reach the debtors at the right time, the balance are previous and we are sure many of them are considered by the customer a premature demand; and just a little, if not altogether, vexed, he pigeon-holes the statement or perhaps consigns it to the waste basket.

In sending our statements in this way care must be exercised that a statement is not mailed for an account that has been paid. As a precaution against such error the statements are checked against the accounts, before mailing them. Let us suggest that your bookkeeper should be required to post up his credits daily, not leave the office on any day until this is done. This is a safeguard against errors in sending out duns and it also safeguards the credit man, who frequently refers to the account of a customer to learn its condition.

STATEMENTS FOR OVERDUE ACCOUNTS

Statements of overdue accounts should be handled in the following manner: The account being overdue, a statement has already been sent, perhaps a draft made, and in many cases the second, third and perhaps the fourth letter written the customer. These statements all have a place. Your collection correspondence should not go into the general file until the collection is made, completed and closed. To such accounts as have required correspondence, the respective statement should be attached to come up and be sent to the customer when you again write him. This looks like a lot of labor, but it is not. It is the work of a few brief minutes—try it. After these statements have been attached you will have some remaining; these will be of accounts for which you made drafts and which drafts appear outstanding. Turn these over to the party in charge of the draft list, and have statements destroyed as drafts are paid, or in the event of a draft being returned and customer not having remitted, attach statement to it and you have it to send to your customer with the first letter you write him.

DRAWING ON CUSTOMERS

A list is made of the statement sent out, and before making drafts this list must be checked with the ledgers and such accounts as are paid checked out. Those customers who have failed to respond are drawn on in accordance with the notice sent them and a letter goes to them in regard to it.

Here you tell your customer where you sent your draft and that you sent it and he is denied the opportunity of writing you that he did not know the draft had come, where it was, etc. Draft and the letter to the bank are made at the same time. The forms are here reproduced.

FORM LETTERS FOLLOWING UNPAID DRAFTS

Now your drafts begin to come back unpaid. If an explanation is made for its return, you have a collection requiring special treatment and circumstances must suggest what this shall be. In the majority of cases the endorsement is: ‘‘No attention,’’ and we proceed to learn why by writing a letter expressing the belief that the return of the draft unpaid is undoubtedly due to some oversight, and stating that it is felt that the account is correct and therefore the favor of a remittance is requested. The letter is filed to come up in eight or ten days and a second is sent asking if the earlier letter was received and, at any rate, expressing a fear that something has gone wrong, as no word was received. If then no answer is received, another letter is written at the end of eight days, telling how many letters have already been written and how much the account is overdue. It is suggested that the debtor probably has some good reason for withholding settlement and that if such is the case some information in this connection would be very much appreciated.

If still no answer is forthcoming in eight or ten days, another letter is sent out, and the suggestion is made that perhaps the debtor is experiencing some crisis in his business and, if that is the case, the company would be glad to be of some assistance. This letter, it is found, is usually a good test. If the case is not one of need for money to continue the business, the debtor's pride takes a part and a settlement is usually effected at this stage.

If, however, the desired result has not been effected, another letter is sent out asking the debtor if he considers he is giving the company proper treatment and that, as no reason can be conceived for the apparent disregard, a remittance or a letter at least is expected. If this is not effective, a letter of a highly confidential character is sent out by the sales manager, who sometimes has to send a second letter.

Next the credit man writes a letter of some length suggesting that perhaps the debtor highly appreciates that the collectors of the company are affiliated with numerous commercial and reporting agencies of the company, and that their lists are at the disposal of such agencies. It is suggested that it would be unfortunate for any debtor to be reported, because it alarms other houses concerning him. If even this letter fails, a telegram is sent, with charges collect, asking why settlement is not made. And the telegram is confirmed in a letter explaining briefly the endeavor that has been made to get payment and that unless immediate attention is given the claim must be considered a desperate one and handled accordingly.

If this does not get the money in a few days, the next step is to send the debtor a blue letter of the National Association of Creditmen, and if this fails the National Association of Creditmen's white letter goes. Following this the agency gets after the debtor at this point and it is finally determined whether suit is necessary.

EXTENDING CREDIT IN PLUMBING SUPPLY TRADE

Questions on Problems of Extending Credit and Views of Several Members of Eastern Supply Association

Some of the present-day problems encountered by the jobber in extending credit to the plumber were recently submitted by Daniel L. Van Hee of Samuel Sloan & Co., Rochester, N. Y., to several members of the Eastern Supply Association. These questions are of interest not only to the jobbers, but to the purchasers of plumbing supplies as well, as a matter to be taken into consideration in the conduct of business. These questions, together with a brief analysis by Mr. Van Hee and his ideas thereon, and replies received from members are given hereinafter. For convenience in designating the replies the following key is given:

(A)—Letter from a New York City jobber, under date of October 4, 1912.

(B)—Letter from a New York City manufacturer, under date of October 4, 1912.

(C)—Letter from a Portland (Me.) jobber, under date of October 4, 1912.

(D)—Letter from a Washington (D. C.) jobber, under date of October 4, 1912.

(E)—Letter from a Boston (Mass.) jobber, under date of October 4, 1912.

(F)—Letter from a Syracuse (N. Y.) jobber, under date of October 5, 1912.

(G)—Letter from a Troy (N. Y.) jobber, under date of October 7, 1912.

(H)—Letter from a Philadelphia (Pa.) manufacturer, under date of October 12, 1912.

FURNISHING CAPITAL

Shall the jobber allow his supplies to furnish the capital for the plumber?

A few months ago a new firm started in business, and in the usual course of events, one of the firm came to see me about credit. In our conversation I learned that there were to be three partners, all practical workmen, and they intended to do plumbing, heating and tinning. No job would be too small for the most careful attention, and none too large for them to handle. Their combined capital was $300.

It took me a few minutes to get my balance, but I managed finally to whisper that we would have to begin our dealings on a cash basis. The disappointment was so manifest that I accompanied him to the door and said, "After you have been in business a little while I may be able to give you some credit on our monthly settlement plan." It may have been three or four months afterward when the salesman who introduced this firm to me came back and said: "Well, I guess you sized that firm up all right, the partners are having trouble between themselves, and one of the firm told me they owe about $2300."

The trouble began over one partner taking a trip to Boston, spending about $90 of the firm's money, and among their assets was an automobile bought for business purposes. With the amount of credit this firm was able to obtain, it would have been an easy matter to draw out their $300 investment, and what capital remained would be furnished by the jobber from his material sold on credit.

SUMMARY OF REPLIES

(A)—No.

(B)—The jobber always has supplied the capital to the plumber without interest, and probably will continue to supply the capital. If he does, then he should receive interest for the use of his money.

(C)—No.

(D)—We should not, but usually have to furnish capital for the plumber.

(E)—No.

(F)—No.

(G)—As a rule, no.

(H)—The jobber should not allow his supplies to furnish capital for the plumber, nor compel the manufacturer to wait for his money until the plumber has paid him.

INTEREST ON PAST DUE ACCOUNTS

Interest on past due accounts or cash settlement. Which?

On this question I have already expressed my views in two articles published in *Domestic Engineering* and *Plumbing and Heating Magazine,* and I still maintain that the maturity of our bills should mean the same as the maturity of a note or the payment of interest due on a mortgage and should be enforced. If the customer wants an extension he should be made to understand that such favors are for him to solicit, and he should go to his creditor and not make the creditor go after him. The credit man will then have the opportunity to learn the real cause for his inability to settle, and on the merits of the case decide if a few days' grace are to be given, a note with interest taken or no further credit allowed until payment is made. If payments are expected between the first and tenth day of the month, it might be understood that the "few days of grace" are the balance of the month.

Should there be no money in sight at the end of the month an interest-bearing note could be given if the financial standing of the customer warranted it. Right here I wish to explain that my argument is not against making the customer pay interest on past due accounts, but rather against allowing the account to run with little or no effort made to secure prompt payment, and going over the accounts once a month and sending bills for interest on past due balances. To my mind this procedure suggests that you are willing to carry the account for the interest return on your money.

SUMMARY OF REPLIES

(A)—Cash.

(B)—Interest should be charged on past due accounts and all bills should be stamped, stating such fact.

(C)—Cash settlements on the time basis agreed.

(D)—Our idea would be to have all the jobbers agree that after accounts are sixty days old, that they sell more goods for cash only. A cash discount seems to affect only the plumbers who are fairly good pay, and does not seem to have any effect on the real slow customer.

(E)—Cash settlement.

(F)—Cash.

(G)—Cash preferred of course, but interest should be charged on past due accounts in every case.

(H)—Cash every time, but the person and circumstances should be considered.

CHARGING INTEREST TO STIMULATE PROMPTNESS

Does charging interest after maturity stimulate prompt settlement?

My experience has been that it does not. Whenever I have sent a bill for interest to a customer who is a good financial risk, I feel that if he pays the interest charge, he is under no special obligation to us for the extra time, but has paid us for the use of our capital and I assume that he feels about the same toward us. On the other hand, I imagine the customer who is not a first-class financial risk smiles when he looks at the bill and thinks how easy it is to get this extra time for such a cheap rate of interest.

SUMMARY OF REPLIES

(A)—Yes.

(B)—We believe that the charging of interest stimulates prompt settlements.

(D)—Charging interest after maturity seems to stimulate only a few of our customers and has no effect on the majority.

(E)—At times.

(F)—Yes.

(G)—Yes, most emphatically, yes.

(H)—Charging interest after maturity is one thing, and getting it, another.

CAPITAL OR EFFICIENT MANAGEMENT

Which enables the plumber to discount, capital or efficiency?

By efficiency I mean—good business methods, good work, prompt service, promptness in rendering bills for work done and following up collections on past due accounts. And we all know that more money can be made on a small volume of business properly conducted than on a very large volume where the work is poorly done, finishing of contracts unnecessarily delayed, improper bills rendered with omissions and overcharges, and no system of following up collections or looking after the work in progress.

SUMMARY OF REPLIES

(B)—Both capital and efficiency are requisites to the discounting of bills purchased.

(C)—About 65 per cent. efficiency, 35 per cent. capital.

(D)—Both.

(E)—Combination of the two, latter is preferable.

(F)—Capital.

(G)—Both, but efficiency is the most important.

(H)—The plumber who discounts has character, energy and efficiency.

CLASS OF ACCOUNTS REQUIRING EXTENSIONS

What class of accounts usually requires extensions?

Customers who carry an overstock of goods; who buy on 30 or 60 days' time, and let their customer pay every six months, once a year, or when the crops are good; those who are doing too much business for the amount of their capital; and especially those who are lax in their business methods.

SUMMARY OF REPLIES

(A)—Lack of capital and lack of efficiency.

(B)—Contract accounts.

(C)—Extensions required by those employing slack office methods and poor collecting.

(D)—The accounts which usually require extensions are the ones that are contracted by customers who overbuy, and do not look after their business as it should be looked after.

(F)—Slow accounts.

(G)—Could not answer intelligently. Question too broad. But we find hardware dealers as a rule slow payers.

(H)—In the Micawber class, the ones who are waiting for something to happen.

INVESTMENT IN PAST DUE ACCOUNTS

Is the average past due account a good investment at six per cent. interest?

No. The man who constantly carries an overstock is likely to accumulate a lot of unsalable goods. Giving long time on accounts increases the chances of loss on bad accounts. Doing too much business usually leads to carelessness and waste of good materials by employees. Lack of capital encourages the giving of extra discounts, exorbitant rate of interest on borrowed money and loss of cash discounts; and waste through lack of correct habits and business methods cannot be estimated.

SUMMARY OF REPLIES

(A)—No, but better get interest on slow accounts than none.

(B)—No. As the account always carries some risk and money can be invested with comparative safety on a six per cent. basis.

(C) and (D)—No.

(E)—No, seldom.

(G)—No, no, no.

(H)—Depends upon the party, whether it is good or bad.

LARGE ACCOUNTS VERSUS SMALL ONES

Does the function of the jobber of plumbing and steam supplies depend on the patronage of the small dealer who cannot afford to carry a full line of supplies bought direct from the manufacturers?

It has been the contention of some large plumbers and steam fitters that the jobber fosters the irresponsible dealer as an outlet for his supplies, claiming that through his backing it practically makes the jobber a partner to the small dealer and therefore a competitor of the big fellow who has the capital to buy wherever he pleases and often from the manufacturer direct.

The question is, would the jobber be able to make a living if he sold only to the so-called large plumber who prefers to carry a big stock and buy direct from the manufacturer:

To my mind it does not. The fact that so many small dealers are so successful is because they are letting the jobber carry their stock of goods, and if they have to pay an extra five or ten per cent. on single lots from the jobber's stock, they buy just what is needed for a particular job, and they save on handling, rent of warehouse, insurance, unsalable goods and capital invested much more than they could make by carrying their own stock. A large contractor said to me the other day: "The sooner we wake up to this fact and act upon it, the better it will be for us."

SUMMARY OF REPLIES

(A)—Depends on the nature of business, no matter how small.

(B)—We don't believe it does.

(C)—Under existing conditions yes, to a certain extent.

(D)—We do not know any plumber or steamfitter who is able to carry a full line of supplies, bought direct from the manufacturers. Some few do buy certain supplies, such as finishing material, in some cases, but we find the jobber has to finance nearly every job.

Several questions of interest to both buyers and jobbers of plumbing supplies were discussed in the first part of this article in the issue of February 14. The questions, as explained in that issue, originated with Daniel L. Van Hee, of Samuel Sloan & Co., Rochester, N. Y., and the answers as indicated by the key letters came from members of the Eastern Supply Association. The conclusion of the questions, discussion and answers are found in the following:

QUESTION OF SECURITY

Should a dealer without capital be required to give security?

Yes! Almost every person who goes in business has some friend or relative with money that could guarantee his account, and with such a guarantee the seller would have good security, and the inexperienced man would have some one with some knowledge of business affairs to coach him. If a man has no capital and no friends to back him he should look for a job.

SUMMARY OF REPLIES

(A), (D) and (F)—Yes.

(B)—We assume that all dealers have some capital.

(C)—In about 60 per cent.

(E)—Yes, on large orders.

(G)—Yes, always.

(H)—In this case as in others, depends on the character of the dealer.

DEALERS WITH SUFFICIENT CAPITAL

Is it reasonable to expect prompt payment from a dealer who operates without sufficient capital?

No! One of our salesmen came to me last week about a customer who has been discounting bills between the first and tenth day of each month. He said: "Have you ever told them you would not sell them unless they discount their bills?" They seem to be afraid to run up a big account. I have quoted them repeatedly on carloads and I know that my price has in some instances been all right, but they don't give us the order. I am going to quote them now on two carloads, but I am afraid I won't get the order unless I can put it up to them that they can have all the time they want." I promised to look up their credit carefully, and this is what I found:

STATEMENT

Assets—		
Stock on hand	$5,000.00	
Book accounts	2,000.00	
Cash	50.00	
Tools and fixtures	400.00	
		$7,450.00
Liabilities—		
Owing for merchandise not due	$1,800.00	
Owing for merchandise past due	1,200.00	
Owing at bank	500.00	
		3,500.00
		$3,950.00
Annual sales		$15,000.00

Is there any possibility of a firm in this condition paying bills promptly, and what can a jobber expect who sells them in carload lots, but to wait until they are able to turn over this overstock?

SUMMARY OF REPLIES

(A)—Yes, because small dealer must be a prompt collector to enable him to be prompt.

(B), (D), (F) and (G)—No.

(C)—This depends on the business ability of the dealer.

(E)—Hardly.

(H)—To gauge the amount of capital to be considered sufficient is a problem, and because a man does not pay promptly does not prove that he has not sufficient capital.

MORAL RISKS

How can a credit be regulated in dealing with a moral risk?

This question has already been covered under question No. 8: "Should the dealer without capital be required to give security?"

The moral risk may be of such a high class that security may not be necessary, for example: With a man who has acquired great skill as a workman or financial manager so that you are willing to put up your capital against his ability. This, however, is nothing short of a gamble, and if possible, I would like to see that element eliminated from the credit department. I therefore recommend the use of the "Letter of Credit."

SUMMARY OF REPLIES

(A)—By properly worded written agreements.

(B)—On character and ability of the buyer.

(C)—Our experience is that many dealers with small capital are more prompt in settlement than many with a much larger capital.

(D)—By obtaining security.

(E)—By making certain agreements and having them kept.

(F)—No set of rules can govern this. You have got to know the party you are selling.

(G)—Simply by keeping fully informed, and limiting it to a moderate sum.

(H)—What is known to be a moral risk, sell for cash.

FINANCIAL VERSUS MORAL RISKS

Shall a financial risk be allowed more liberal terms than a moral risk?

The moral risk should pay a premium for the use of the jobber's capital and should not be encouraged or allowed to buy in quantities except where the goods are for contracts secured and in process of construction. In most cases it is advisable to make the time for payment as short as possible, and personally I am in favor of insisting on his taking advantage of the cash discounts. This will regulate the volume of business to what he can take care of and properly finance, and will do away with the possibility of accumulating many doubtful accounts.

The good financial risk should not pay a premium to the jobber for assuming unjustifiable risks, but on account of the security that his capital provides he should not be allowed "special privilege" in extra time or better service.

SUMMARY OF REPLIES

(A)—No.

(B)—No, but this is a question which involves detailed explanation.

(C)—We cannot answer this briefly. In a general way we treat each case individually.

The last question seems to be rather obscure. We intend to fight shy of any moral risks, as one of the first requisites for a credit rating with the writer is the honesty of the party seeking credit.

(D)—It seems to us that this would depend entirely on the person or firm.

(E)—Never.

(F)—Yes.

(G)—Yes, all other things being equal, but a financial risk may be so coupled with other considerations that the moral risk in some cases would be safer.

(H)—Unquestionably a financial risk may receive some consideration, but a moral risk—none whatever.

PROFITS WHICH THE HEATING MAN IS NEGLECTING

Experience of Heating Contractor Who Made Six Hundred Dollars Extra in One Year on Heat-Regulating Devices for Residences—Some Profit-Making Suggestions for the New Year

"You wouldn't be bothered with specialties for the little profit there is in them? I used to think the same thing, but on June 20, 1911, I had some facts and figures placed before me which changed my way of thinking. As a result, I was induced to take up the sale and installation of thermostats for residences, and from that date up to June 20 of this year I made a clear profit of slightly over $600 on them alone. At the narrow margin heating contracts have to be taken these days that sum represents the profit on a good many heating contracts. It has certainly been the easiest money I have made in either the heating or plumbing game."

"You wouldn't be bothered with specialties for the little profit there is in them"

These words were spoken in the hearing of one of the editors of *Metal Worker, Plumber and Steam Fitter* at one of the master plumbers' conventions during the past season while he was standing in the lobby of a hotel waiting for an opportunity to ask a question of one of the three plumbers and steam fitters who, as it was soon learned, were discussing the question of men of their craft attempting to branch out beyond the handling and installing of other than what may be termed straight out-and-out plumbing and heating goods. The editor apologized for interrupting them and explained that he was interested also in the subject and expressed a wish to have the discussion continued in his presence.

''If you did that in your town,'' said Mr. E——, one of the three, ''I don't see why Mr. R—— here and myself can't do just as well. Our towns are fully as large as yours, our lines are the same and competition is much the same everywhere throughout the state. If I can make $600 this year out of heat regulators, or any specialty, I want to do it, and I believe you will be good enough to explain your scheme to us.''

''If anyone will show me how I can make $600 or even $60 extra a year I am willing to take a chance on any reasonable scheme,'' added Mr. R——.

''As I said before,'' continued Mr. A——, ''I made $600 out of these heat regulators last year, and I know from experience that every man who does a heating business can make some extra money by taking them up. The amount, of course, will depend on several things, but the scheme is worth trying.

THE SALESMAN'S SUGGESTION

''On June 20 last year a boiler salesman from Detroit dropped into my office and after getting my order for two boilers, some radiation and valves, we talked for a little while about the outlook for business. I complained that competition was so keen that there was but little money in the heating business any more.

"He then said he thought we plumbers and steam fitters were making a mistake in sticking so closely to the staples in these lines. He pointed out that naturally there would be keen competition in goods which everyone handled and work which everyone could do. He told me of a plumber and fitter he knew who had made what many would consider a nice profit last year out of handling such specialties as heat regulators, vacuum cleaners, washing machines, electric kitchen appliances such as smoothing irons, toasters and the like, wind-mills, lighting fixtures and acetylene gas lighting plants.

"Our talk finally drifted around to the heat regulators, for I could see there was a good chance for these and I might be able to make some sales without much trouble. I asked the salesman what he knew about the different heat regulators on the market and what ones he would advise me to handle.

"We had a long talk in which he told me what he knew about the different makes. He advised me to get catalogues of the different makes, study them up and be prepared to furnish any one to a customer. This I found afterwards was good advice, because there are regulators which can be sold from $5 up to $40. Sometimes a customer can afford to buy only the cheaper one, while others will select a more expensive one.

PLAN OF SELLING

"Now for my plan! Before the salesman left my office I had him give the names and addresses of every thermostat manufacturer he could remember. I then wrote a letter to every one of them, stating that I would like to have their catalogues and would be glad to have them write me in detail, outlining reasons that I could put before a customer to induce him to install their particular heat regulator. I received the catalogues very promptly as well as some very interesting and instructive letters.

"During the next two weeks I made a careful study of these catalogues and letters so that I could explain quite readily how the different regulators worked and also prepare what I call my selling arguments, which I use when talking to a customer to try to get him to install a regulator.

"As soon as I was sure that I thoroughly understood the construction of the different makes and was perfectly familiar with the claims made by the several manufacturers for every particular type of heat regulator, I decided to see what I could do in selling a heat regulator on every heating contract I booked.

THE FIRST ATTEMPT

"A few mornings after this a man to whom I had given a figure on installing a heating system in his new residence, came to my office to give me the contract. The heating system was to be about of the average steam type, and as this man was going to live in the house himself, he wanted everything to be satisfactorily done. After I had revised my figures in accordance with some changes which he wished made and we had signed the contract, I broached the subject of his having a heating regulator attached to the boiler.

A Shovelful of Coal a Day Saved, Means
a Ton in a Heating Season

THE SELLING ARGUMENTS

"At first he was not disposed to consider the matter, as he thought it an unnecessary expense. I made up my mind at once that this was a good place to try out my salesmanship. I first started in on the extra comfort and convenience which he would derive from having a heat regulator in connection with his heating system. I explained to him that I could sell him a heat regulator which would automatically control the drafts so that the heating system would maintain whatever ordinary temperature he might desire in his living rooms without any trips by him or his servants to the basement to open or close the drafts. I also pointed out to him that on retiring at night he could set this regulator to maintain a much lower temperature in the house during the night, thus insuring against the fire going out and then have the drafts automatically regulated in the morning so that the rooms would be at a comfortable temperature before it was time to get up in the morning. I pointed out this feature alone was worth the price of the regulator because by its use he would avoid the discomfort of having to go down to the heater early in the morning when the house was cold to start up the fire and then wait for some little time before the temperature in the rooms became comfortable.

"I also pointed out that after dinner in the evening when he had settled down for an evening's rest he would not have to get up now and then to go down to the cellar to operate the drafts on the heater should the room become too warm or too cold as it is most likely to do when a heater is not provided with automatic draft regulation. I told him that if he had the proper type of heat regulator this would all be attended to automatically and a uniform temperature of 70 degrees, if so desired, would be maintained in the room without any trips to the basement except, say, two or three times a day to place coal on the fire. I then told him that both he and his family would enjoy better health if an even temperature were maintained in his home than if he failed to provide the heat regulator when the temperature in the living rooms would be likely to vary considerably, so that at certain times they would be suffering from overheating, while at other times the room would be too cold.

''Another point I brought to his attention was the fact that the servants, if he kept any, would be more likely to be better contented if he had a heat regulator, as they would not have to get up in a cold room in the morning or work around the kitchen or dining room before it became comfortable.

CUSTOMER BECOMES INTERESTED

''These arguments aroused his interest somewhat and he asked me how much one of these heat regulators would cost. I told him that there were a number of different kinds ranging in price from $5 to $40, and I would be glad to explain the differences in construction and would let him choose the type for himself.

THE ECONOMY ARGUMENT

''I told him, however, before getting out any of the catalogues that a most important point to keep in mind in deciding this question of having a heat regulator installed was the question of economy. I called his attention to the fact that every time the temperature in his house became too high, or higher than he desired, he would know that he was wasting fuel. I told him that if he had a heat regulator which would prevent the temperature in the house going above the comfortable degree desired, he would in this way save fuel.

SAVING IN FUEL

''I then picked out one of the regulator catalogues which contained two charts, one showing a record of temperatures for a day in a house when no heat regulator was attached to the heater, and then another chart showing the temperature in this house a week after the heat regulator had been put on when the weather conditions outside were about the same. In the chart where no heat regulator was used the line indicating the temperature was very wavy and frequently went up as high as 80 degrees and sometimes down as low as 65 degrees, while in the case of the heater which was equipped with the heat regulator the line was almost uniformly on the 70-degree mark during the daytime, as desired, and never over a degree above. I used this to impress on him the fact that the heat regulator had thus saved the amount of fuel which would be necessary to raise the temperature of the room from 70 degrees up to 80 degrees as often as the record showed the temperature had been raised to that point.

"I called his attention to the fact that statements had been made that in ordinary weather it was necessary to make only two trips per day to the basement to put coal on the heater when a heat regulator was installed, and I asked him to judge from his own experience if such conditions had existed in houses where no heat regulator had been installed which had come under his notice, and made the statement that if he were to save only a shovelful of coal per day, which is about 10 pounds, it means that he would save a ton in the season. I then called his attention to the fact that aside from the increased comfort and satisfaction he would derive he would make a saving of at least the cost of one ton of coal per year. I did not forget to tell him that this saving would be repeated each year and that instead of the heat regulator being an expense it would really be an investment.

"I also pointed out as a matter of economy that there would be less wear and tear on the heating system, especially the boiler, if the fire were allowed to burn uniformly and never get overheated, which would be the case if no heat regulator is installed. I pointed out that there would be less repair bills for grates and less broken sections if a heat regulator were used. I also pointed out that while explosions in house heating boilers are few, the danger from such an accident is minimized by the use of a heat regulator because it will check the fire and not allow a sufficient amount of steam pressure to be generated to cause an explosion.

''I also pointed out that with a heat regulator the combustion is more uniform and the coal is more completely consumed with the steady fire which prevails with a heat regulator than with the intense fire at one time and the slow fire at another which is likely to happen in the absence of a heat regulator.

''Another advantage I pointed out was that with a heat regulator there is less danger of fire starting from overheating than if no heat regulator is placed on the heater.

''By this time he had become interested and was anxious to learn about the different types of regulators I could sell him. I first told him that I could sell him a regulator which would operate the drafts at stated hours and explained that these worked with a time attachment; that all he had to do was to set the clock for the time at which he wished the draft to open or close and that when that particular hour arrived the mechanism would be operated by the clock as desired. I explained different types from this time attachment only to the automatic type which operates the damper as a direct result of the effect of the temperature of the room on the thermostat. I told him that he could have a combination time attachment and automatic heat regulator if he desired.

SELECTING THE ADVERTISED TYPE

''He went away stating that he would give this matter his consideration and let me know in a few days. He came back within a week and had three advertisements which he had torn from popular magazines of just that many types of heat regulators. I talked with him about some of the others and showed him advertisements in trade papers which I had. He seemed to have more confidence in these and finally decided on a combination automatic and time attachment regulator.

''This was my first sale and I felt somewhat encouraged. My next customer was a builder who gave me an order to heat five houses which he had for sale. I tried the same arguments on him which I had tried on my first customer insofar as they applied, working in with them the fact that his houses would be much more salable if the heating system in every one of them were equipped with a heat regulator. He was shrewd enough to see that the added attraction to his houses would more than offset the cost of a heat regulator. In fact, he told me afterwards that one sale at least he felt was made largely as a result of this piece of refinement, as he called it, in the heating system. I succeeded finally in getting an order from him for five heat regulators of a different make.

TEN OUT OF TWELVE

''In the case of the first twelve heating contracts I tried after taking up the question of selling heat regulators, I succeeded in getting the owners to equip their heating plants in ten of the cases with heat regulators, and during the year I put a heat regulator on three out of every four heating plants I installed.

LIST OF CUSTOMERS A GREAT HELP

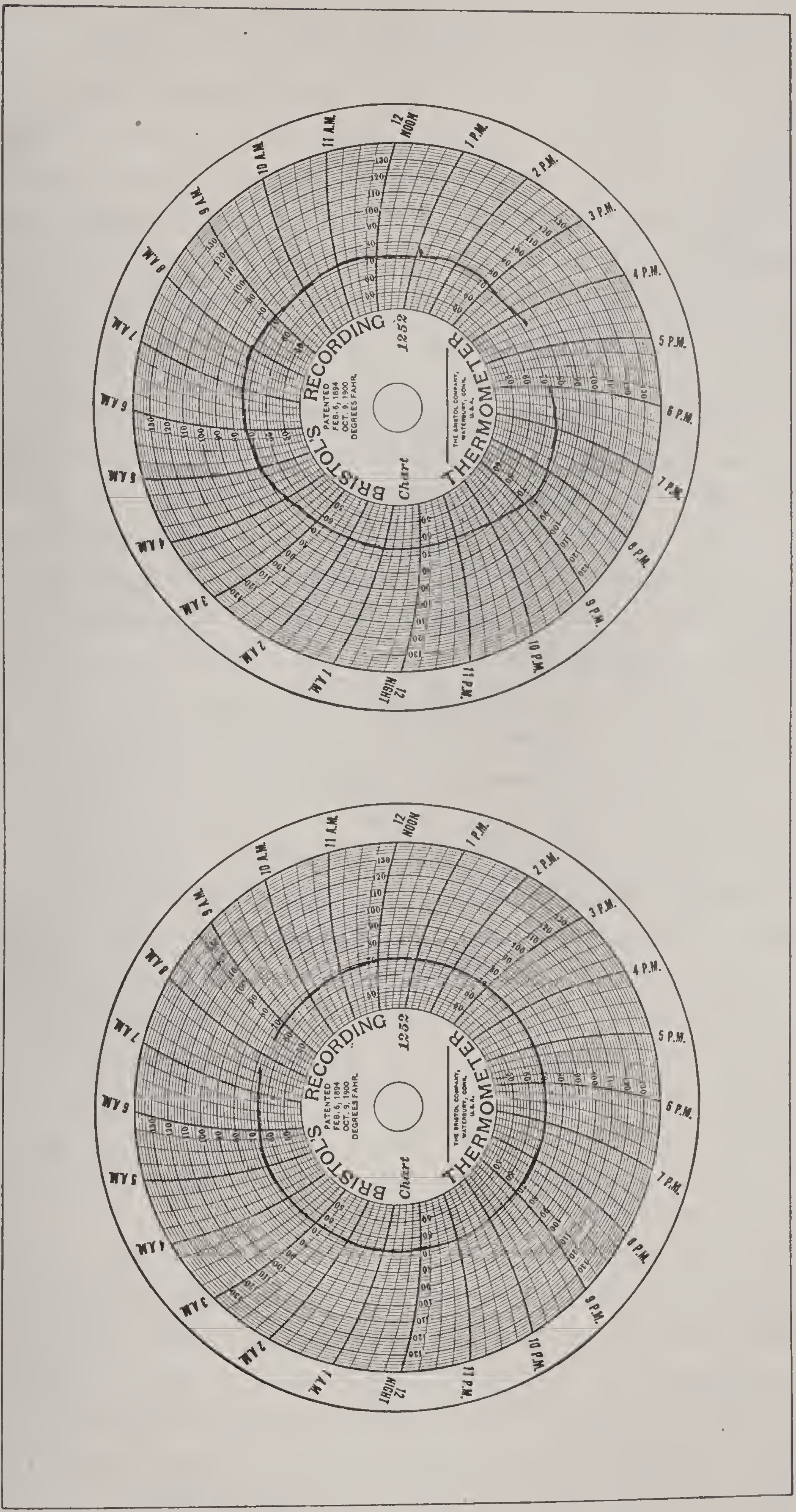
''You may think it took a great deal of talking and persuasion on my part to make the first sale. It also took me some time to read up and get to know the different makes, but it all paid in the end. It doesn't take nearly as much talking now, as I have an excellent list of customers for whom I have installed these regulators, and a reference to a few of these is my best selling argument now. I find that when a man installs one of these thermostats he is so pleased with it that he is sure to mention it to everyone who comes to his home, and this has helped me a great deal in making other sales.

GOING AFTER OLD CUSTOMERS

''After I had sold the first ten it occurred to me that probably I could induce some of my customers for whom I had already installed heating plants to add a heat regulator to their heating system, and I accordingly got up a letter which I sent out generally to my customers on this subject. I made the letter short and in it advised each customer that I had recently taken up the question of handling devices for automatically maintaining uniform temperature in a room, and if given an opportunity could convince the person addressed that one of these regulators would actually save one ton of coal in a heating season. I stated that I would be glad to have any of my customers call at my office to see how these heat regulators worked. I made it clear that I had no intention of bothering them at all, but felt that they could make their houses more comfortable, their heating plants more satisfactory and make a nice saving besides.

What a Comfort to Have the Heat Regulator Start the Fire in the Morning

"In response to this letter a goodly number of my customers came to the shop to see these heat regulators, and I succeeded in selling quite a few to those who came in. I kept a careful list of those who did not reply or come into my shop and then telephoned to those whose telephone address I had, asking whether or not they were interested and stated I would be glad to call and explain the matter to them at their convenience. By a little persuasion I succeeded in getting permission to call on a number of these.



Thermographic Charts May be Used to Advantage in Selling Heat Regulators

The chart on the left shows uniform temperature secured in a house by automatic temperature control. That on the right shows the varying temperature prevailing before the installation of the regulator

"To those who did not have a telephone I sent a second letter embodying persuasion I had used over the telephone to the others, and had some replies from this.

"I figure I was put to no expense for the time and cost of stationery, letter writing and telephone charges in this matter because I succeeded in getting some repair and alteration work which probably would not have come to me at that particular time as a direct result of my getting in touch with these customers.

"I do not know that I have anything more to say except that I feel that the handling of heat regulators by the plumber and steam fitter will bring profit and add little to his costs."

After Mr. A—— had finished, the two other plumbers and steam fitters asked him a number of questions, most of which had to do with the objections which must be overcome in selling these goods. The chief objection to be overcome, Mr. A—— stated, was the cost, but, he pointed out, with a careful study of the proposition anyone could soon coach himself sufficiently to show the average householder that in the course of a few years the most expensive heat regulator would pay for itself and after that in time it would declare dividends on the original investment. He pointed out that anyone who took up the sale of heating regulators would be successful according to the amount of study he put into the matter and his ability as a salesman. He remarked that it would really be a good thing for many plumbers and steam fitters to take up this question even if they did not sell very many of the heat regulators because it would improve their ability as salesmen for their regular goods.

The editor upon returning to the office made the necessary record of the conversation and decided to investigate the question of plumbers and steam fitters handling heat regulators. The latest literature of every one of the manufacturers was obtained and information asked from them as to sales methods and the like. It was found that Mr. A—— had made a rather exhaustive study of the whole proposition and it appeared that the handling of these devices was well within the scope of every steam fitter and heating contractor.

The sales method employed by many of the manufacturers comprises a 30-day free trial. This seems to give the steam fitter a considerable advantage and assistance in making sales. The manufacturers are anxious to cooperate with the steam fitters and will give them a great deal of assistance in starting out a policy of selling these heat regulators.

A feature which is worthy of attention in this matter is the increased satisfaction which a householder is likely to obtain by having automatic regulation of his heating system. Cases have been reported where the heating system which has been unsatisfactory has become perfectly satisfactory after a heat regulator has been attached. The handling of heat regulators, therefore, would seem to assist the heating contractor in giving more satisfactory service as well as in yielding him a liberal return for his time and energy spent in getting orders for them.

The statement has been made that only one furnace dealer out of fifty furnishes heat regulators with his furnace. This would seem to indicate that there is an opportunity for progressive steam fitters and heating contractors to take up this question of furnishing heat regulators.

RULES FOR WORKMEN

On the back of the time sheets used by some Baltimore firms are the following rules:

1—All employees must be in their respective places 10 minutes before beginning work; or coming late, will be docked one hour. Clean overalls must be provided every Monday morning.

2—Punctuality, cleanliness and general decency about work are matters of great importance. Smoking and liquor drinking during working hours are forbidden. Damage done by tobacco chewing will have to be made good by the user.

3—Employees are expected to work the full hours agreed upon. Working dinner hours and other irregular ways is not permitted unless by special previous understanding with the firm.

4—Each employee will be held responsible for his tools. If these be lost, misused or destroyed their value will be withheld from his wages.

5—Boisterous or vulgar language is prohibited.

6—Each workman shall be paid by the hour, and no time will be considered while going to or from work only in being changed from one job to another.

7—Each employee must keep his time recorded on job sheet and also report daily his time at the office not later than the following morning.

8—All time cards must be handed in every Friday evening, at which time each week's labor ends, and must be signed.

9—The man in charge of any job of work is to be obeyed without question. His orders can only be countermanded by the firm.

10—All damage done by employees on any work, material, tools or building where work is being done, will be charged to the culprit, and will be deducted from his wages.

11—No employee, unless authorized to do so, is permitted to sell, give away, loan or remove any tools or material of any character from stock room, shop or jobs.

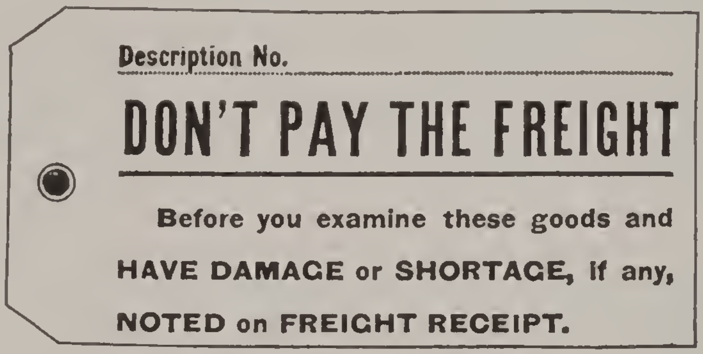
12—Positively no money is advanced through the week.

13—The standing of the men in this shop will depend entirely on their workmanship and the interest they take in the firm's behalf, as well as the faithful observance of these several rules.

SHIPPING TAG WARNS OF BREAKAGE

A COMMENDABLE feature is to be noticed on the shipping tags used by the Globe Stove & Range Co., Kokomo, Ind.

One side of these tags contains the following sentence: "*Don't Pay the Freight* before you examine these goods and have damage or shortage, if any, noted on freight receipt."



Description No. ....

DON'T PAY THE FREIGHT

Before you examine these goods and HAVE DAMAGE or SHORTAGE, if any, NOTED on FREIGHT RECEIPT.

Shipping Tag Which Gives Good Advice to Receivers

The leading line of this sentence is printed in large type with red ink and underscored so there is little possibility of it being unnoticed.

It is too often the case that the hardware dealer has trouble collecting his claims because the proper exceptions were not made on his freight receipts and the use of this tag is sure to call the attention of the man who takes the goods from the depot.

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